

THE UNIVERSITY OF KANSAS SCIENCE BULLETIN

VOL. XXV]

JUNE 1, 1938

[No. 14

Concerning Mexican Salamanders

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ABSTRACT: This study is based on a large collection of Caudata made in Mexico during the years 1932-1936, chiefly by Edward H. Taylor and Hobart M. Smith. Three species are described from the collection of the Museum of Comparative Zoölogy, Harvard College.

Oedipus robertsi (Nevada de Toluca, México), *Oedipus smithi* (Oaxaca), *Oedipus altamontanus* (Morelos), *Oedipus giganteus* (Jalapa, Veracruz), *Oedipus multidentata* (San Luis Potosí), *Oedipus manni* (Hidalgo), and *Ambystoma schmidti* (México) are described as new. *Oedipus leprosus* (Cope), recently placed in the synonymy of *Oedipus cephalicus* (Cope), is revived as a valid species. The following species are discussed: *Oedipus bellii*, *chiropterus*, *cephalicus*, *leprosus*, *orizabensis*, *platydactylus*, *salvini*, *lincolus*, *penutulus*; *Rhyacosiredon altamirani*; and *Gymnopsis multiplicata oaxacae*.

THE present study is based on the collections made by Hobart M. Smith and myself in various localities in central and southern Mexico. Several of the species are represented by large series; some, unfortunately, by only one or two specimens or at most a small series.

Dunn, in his admirable work on the Salamanders of the family *Plethodontidae*, (1926) deals extensively with the plethodontid genus *Oedipus*, uniting with it the distinctive forms sometimes recognized under the generic designations *Oedipus* Keferstein (*Ophiobatrachus* Gray) and *Thorius* Cope. This work has been especially helpful in the study of the genus *Oedipus*.

The recent review of the Ambystomid Salamanders of Mexico by Lafrentz and Wolterstorff (Abh. Ber. Mus. Natur.—Heimatk. Natur. Ver. Magdeburg, Bd. VI, Heft. II, pp. 90-127 and 128-149, respectively), has been helpful in the study of *Ambystoma* and *Rhyacosiredon*.

I am under great obligation to Dr. Thomas Barbour and Mr. Loveridge for the loan of the salamanders of the genus *Oedipus* in

the Harvard collection and for the privilege of describing three new forms.

The following recognized species are known to occur in Mexico (elevation, in feet, is an approximation):

Family *Plethodontidae*

<i>Oedipus bellii</i> (Gray)	lowland (?) to	8,000
<i>Oedipus giganteus</i> sp. nov.	6,000 to	10,000
<i>Oedipus gadovii</i> Dunn	6,000 to	14,000
<i>Oedipus sulcatus</i> (Brocchi)		5,000
<i>Oedipus chiropterus</i> (Cope)	4,000 (?) to	11,000
<i>Oedipus multidactylus</i> sp. nov.		? 8,000
<i>Oedipus robertsi</i> sp. nov.		10,000
<i>Oedipus altamontanus</i> sp. nov.		10,000
<i>Oedipus smithi</i> sp. nov.	9,000 to	10,000
<i>Oedipus macrinii</i> Lafrentz		3,270
<i>Oedipus manni</i> sp. nov.		8,000
<i>Oedipus cephalicus</i> (Cope)	8,000 to	13,000
<i>Oedipus orizabensis</i> (Blatchley)	8,000 to	12,000
<i>Oedipus leprosus</i> (Cope)		10,000
<i>Oedipus platydactylus</i> (Cuvier)		lowland
<i>Oedipus salvinii</i> (Gray)		lowland
<i>Oedipus yucatanus</i> Peters		lowland
<i>Oedipus rufescens</i> (Cope)		lowland
<i>Oedipus lincolni</i> (Cope)	lowland to	4,000
<i>Oedipus townsendi</i> Dunn		4,400-? 8,000
<i>Oedipus pennatulus</i> (Cope)	8,000 to	10,000
<i>Batrachoseps attenuatus leucopus</i> Dunn		lowland
<i>Ensatina croceator</i> (Cope)	3,600 to	7,000

Family *Ambystomidae*

<i>Ambystoma schmidti</i> sp. nov.	about 8,000 feet
<i>Ambystoma mexicanum</i> Shaw	about 8,000 feet
<i>Ambystoma dunreli</i> Dugès	/?
<i>Ambystoma tigrinum velascoi</i> Wolterstorff	6,500 to 7,500 feet
<i>Ambystoma tigrinum tigrinum</i> Green*	lowland
<i>Rhyacoseidon altamirani</i> Dugès	about 11,000 feet

Family *Salamandridae*

<i>Triturus meridionalis</i> Cope	lowland
<i>Triturus kallerti</i> (Wolterstorff)	lowland
<i>Triturus torosus</i> Eschscholtz	lowland

Order *Apoda*

<i>Desmophis mexicanus</i> Duméril and Bibron	lowland
<i>Gymnopsis multiplicata oaxacae</i> Mertens	lowland

It is to be regretted that more detailed data on vertical distribution was not obtained. The value of such data is evidenced by the recent study on salamanders of Guatemala, by Schmidt (1936).

Several species names proposed or used for Mexican forms have been regarded as synonyms of previously described species.

* *Ambystoma proscarpine* Baird and Girard, Proc. Acad. Nat. Sci. Phila. 1852, p. 173.

1. *Spelerpes orculus* Cope. This species has long been regarded as a synonym of *Oedipus chiropterus* (Cope), having been placed in the synonymy of that species by Cope, himself (1869). I have not examined the type.

2. *Bolitoglossa mexicana* Duméril and Bibron (1854), in part. (Erp. Gén. Atlas, plate 104, fig. 2.) is referable to *Oedipus bellii*.

3. *Spelerpes minimus* Wiedersheim. Dunn (1926), declaring it a *nomen nudum*, settles this name in the synonymy of *Oedipus penatulus* (Cope).

4. *Spelerpes morio* Boulenger (1882), Jalapa, Veracruz (non Cope). Probably based on more than one species, but which I cannot say.

5. *Spelerpes laticeps* Brocchi (1883). The description is brief, and I am uncertain whether this species should be recognized or not. The type should be examined and redescribed. The brown color, as shown in the figure (Brocchi, p. XVIII, fig. 1), may be due to the preservation.

6. *Geotriton carbonarius* Cope (1860), Jalapa, Mexico, is apparently referable to *Oedipus platydactylus*. Boulenger (1882) places it in the synonymy of *Spelerpes variegatus* = [*Oedipus platydactylus* (Cuvier)].

7. *Spelerpes punctatum* Brocchi (1883). This has been placed in the synonymy of *Spelerpes variegatus* Gray = [*Oedipus platydactylus*], but the type should be reexamined.

8. *Spelerpes attitlanensis* Brocchi (1883). Schmidt (1936), who examined the types, regards this a synonym of *Oedipus salvinii* (Gray).

9. *Spelerpes gibbicaudus* Blatchley (1893) Mt. Orizaba, Veracruz. This species is founded on the type specimen of *Spelerpes leprosus*, and is a synonym of *leprosus*.

Rhyacosiredon Dunn

1928. *Rhyacosiredon* Dunn, Proc. New England Zool. Club, Vol. X, Nov. 3, 1928, pp. 85, 86.

1930. *Ambystoma* Lafrentz, Abh. Ber. Mus. Natur-Heimatk. Naturw. ver. Magdeburg, Bd. VI, Heft. 2, 1930, p. 115.

1930. *Ambystoma* (*Rhyacosiredon*) Wolterstorff Abh. Ber. Mus. Natur-Heimatk. Naturw. Ver. Magdeburg, Bd. VI, Heft. 2, 1930, p. 142.

Dunn characterizes the genus as follows: "An Ambystomid salamander with no gills or gill slits in the adult state; lungs present; ypsiloid well developed; no free lachrymal; nasal present; adult with vomerine teeth in larval position; maxilla very small; premaxillary teeth aborted, not as long as bony edge of premaxilla;

both jaws with horny beak in adult and larva; larvae with gills with long rami; dorsal fin aborted in large larvae; eggs (ovarian) larger than those of other species, 3 mm. in diameter."

Rhyacosiredon altamirani (Dugès)

1895. *Ambystoma altamirani* Dugès, Description d'un Axolotyl de Montagnes de las Cruces (*Ambystoma altamirani*, A. Dugès), 1895, No. 15. Imprimerie du Ministère de "Fomento" (Type description: type locality "Manantial de los Axolotes en la Serrania de las Cruces, perteneciente al Valle de Mexico"); and *La Naturaleza* (2), II, 1896, pp. 459-461, pl. XIX; Lafrentz, *Abh. Ber. Mus. Natur-Heimat. Naturw. Ver. Magdeburg*, Bd. VI, Heft. 2, 1930, pp. 115-120 (numerous localities in mountains near Mexico City).

1928. *Rhyacosiredon altamirani* Dunn, *Proc. New England Zool. Club*, Vol. X, Nov. 3, 1928, pp. 85, 86 (Santa Fé, Contreras 8,090 feet, Dos Rios 8,800 feet, all in the Ajusco Mountains south and west of Mexico City).

1930. *Ambystoma (Rhyacosiredon) altamirani* Wolterstorff, *Abh. Ber. Mus. Natur-Heimat. Naturw. Ver. Magdeburg*, Bd. VI, Heft. 2, 1930, pp. 142-144, fig. 11.

Two specimens (EHT-HMS, Nos. 12511, 12512) in the collection were captured under logs, near a small stream flowing into Lake Zempoala, at an elevation of about 11,000 feet.

While agreeing in most characters, these two specimens differ in certain points which may be due to the age of the specimens.

No. 12511. Body with numerous distinct black spots on the dorsal and dorsolateral surfaces; head spotted likewise. Tail clouded with lighter and darker mottling; many maxillary teeth seem to be missing, there being only about six on each side, these covered with fleshy gums; six premaxillary teeth, elongate, curving. Vomerine teeth in elongate series which converge, but fail to meet anteriorly by a distance equal to more than double the diameter of the rather large choanae; each series is broken; the posterior group of six teeth is slightly curved around the posterior part of the choanae to a point nearly opposite the middle of choanae, where a break, equal to the width of a choana, occurs; the following eleven teeth form a straight continuous series.

No. 12512. Color, generally drab olive, the dark spotting not or scarcely discernible; the tail is mottled, similar to the previous specimen. Maxillary and premaxillary teeth form an unbroken series of 17 (18) teeth in each half of the jaw; the premaxillary series consists of 8 teeth.

In both specimens the limbs are very large and the body very short. Limbs when adpressed overlap the length of the arm from elbow. Metacarpal and metatarsal tubercles very distinct, large, rather close together. Twelve costal grooves; no groove behind eye; interorbital distance very wide; a skinfold on lower lip; tips of digits brownish; no enlarged mucous pores on head.

Measurements (in mm.) of Nos. 12511, 12512, respectively: Snout to vent, 68.2, 64.6; snout to arm, 25, 23.3; tail, 75, 68.5; width of head, 18, 16.5; length of head, 22, 19; axilla to groin, 33.5, 32; foreleg, 27, 24.5; hindleg, 29, 25; interorbital distance, 5.3, 5.4; eye to nostril, 4.4, 3.5; length of snout, 5.2, 4.4; eyelid, 2, 2; eye, length, 3, 3.2; between nostrils, 5.1, 5.

I believe that Dunn is fully justified in placing this form in a genus separate from *Ambystoma*.

It will be noted that these specimens display nothing that can be construed as horny beaks. There is, however, a slight deposition of keratin along the borders of the lips, which is scarcely noticeable. This condition may be due to the age of these specimens.

Ambystoma schmidti sp. nov.

Holotype. EHT-HMS No. 3999, collected 10 miles east of San Martín (Asunción) at Rancho Guadalupe Aug. 3, 1932. E. H. Taylor, collector.

Diagnosis. A very small species of *Ambystoma*, with short limbs and relatively small feet; adpressed limbs separated by three costal folds; 14 costal grooves (an axillary fold apparently wanting); length of eye about equal to the distance of the eye from the nostril; width of eyelid contained more than two and one half times in the interorbital distance; a nuchal fold; tail shorter than the head and body. Tongue with a deep median groove; series of vomerine teeth, beginning behind choanae near their posterior inner border, form an arch between choanae; two tubercles on hand and foot; four phalanges in fourth toe.

Description of the type. Head flat with trace of a canthus rostralis; nostrils nearer tip of snout than eye, the distance between them about four fifths of interorbital distance; a slight median occipital depression with very slight longitudinal swellings; a slight median dorsal groove along the middle of the back; a well-defined fold across underside of neck, continued as a groove on the side of the neck, but not continued across the dorsal surface; a groove beginning in the upper temporal region crosses the angle of the jaw and passes beneath the chin to meet its fellow from opposite side; a deep groove from eye runs back to the lateral nuchal groove, where it terminates; below the posterior part of this groove is a fold of skin terminating at the lateral nuchal groove; 14 costal folds (that in axilla apparently wanting); 12 grooves cross the abdomen; lips of anal slit swollen, the walls showing some slight foldings; limbs rather short, separated by three costal folds when adpressed; first

finger well developed, the second and third largest, of nearly same size; fourth toe much longer than first; all digits flattened somewhat with a slight skinfold along their edges; a slight indication of a web between toes; foot broad, the ascending order of length of toes, 1, 5, 2, 3, 4; toes rather bluntly pointed; tail compressed, with only a slight trace of a crest for a short distance on the base of the tail. Skin smooth, the head showing minute pitting.

Vomerine teeth in a continuous series consisting of about 16 teeth; they begin behind the choanae near the inner posterior edges and curving between choanae, fail to reach the level of their anterior edge; a median depression in the palate anterior to the vomerine teeth; groove from the choanae covered by a triangular projection from side of jaw; maxillary and premaxillary teeth about forty on each side; a few other scattered teeth behind the regular series, anteriorly.

Color. Above violet to lavender with small scattered cream spots on sides of head, body and tail; tail somewhat darkened on side; below yellow-cream, the color extending somewhat on sides; upper side of limbs somewhat lighter than body.

Measurements (in mm.). Snout to vent, 52; tail, 37; head length, 10; head width, 9.3; snout to arm, 15; axilla to groin, 28.4; arm, 12; hand and finger, 4.3; leg, 14; foot and longest toe, 7.5; eye length, 2.3; interorbital distance, 3.5; eyelid, 1.25.

Remarks. The specimen was obtained from under a log in a pine forest near a large artificial pond. It is not, apparently, closely related to the other recognized Mexican species of the genus, as evidenced by the absence of large pits on the head, and the very small limbs. The elevation of this locality is probably 8,000 feet.

This species is named in honor of Dr. Karl D. Schmidt, of the Field Museum, Chicago, who has had the kindness to furnish me with comparative salamander material from Central America.

Oedipus bellii (Gray)

(Plate XXVII; figs. 1, 2)

1849. *Oedipus platylactylus* Baird, Journ. Acad. Nat. Sci. Philadelphia, (2), 1, 1849, p. 286 (Not *Salamandra platylactylus* Cuvier).

1850. *Spelerpes bellii* Gray, Cat. Batr. grad. Brit. Mus., p. 46 (type description; type locality, "Mexico"); Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 372; and 1869, p. 105; and Proc. Amer. Philos. Soc., 18, 1879, p. 263; and idem, 1869, p. 105; Boulenger, Cat. Batr. grad. Caud. British Mus., (2), 1882, pp. 68-69; Brocchi, Mission Scientifique au Mexique et dans l'Amérique Centrale, Etude sur les Batraciens, Livr. 3, 1883, p. 110, pl. 206 (part.); Ferrari-Perez, Proc. U. S. Nat. Mus., 9, 1886, p. 199; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 8; and Bull. U. S. Nat. Mus., No. 34, 1889, p. 161; Blatchley, Proc. U. S. Nat. Mus., 16, 1895, p. 37 (Part.); Dugès, La Natureza, (2), 2, 1896, p. 482; Moore, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 619; Günther, Biologia Centrali-

Americana. Rept. and Batr., 1902, p. 299; De Leon, Indice de los Batracios que se encuentran en la República Mexicana, June, 1904, p. 37; Gadow, Zool. Jahrb., 1910, pp. 709, 714.

1854. *Bolitoglossa Mexicana* Duméril and Bibon, Erp. Gén., 9, p. 93, pl. 104, fig. 2 (Oaxaca, Mexico; Veraacruz, Mexico); Dugès, La Nature, I, 1869, p. 144.

1854. *Salamandra togata* Valenciennes, mentioned in Duméril and Bibron, Erp. Gén., 9, 1854, p. 94 (apparently not published).

1856. *Spelerpes Mexicana* Hallowell, Proc. Acad. Nat. Sci. Philadelphia, 1856, p. 11.

1881. *Geotriton bellii* Garman, Bull. Essex Inet., 16, 1884, p. 471.

1918. *Oedipus bellii* Dunn, Bull. Mus. Comp. Zool., 1918, 62, p. 471; Field Mus. Nat. Hist. Zool. Ser. XII, pp. 99, 100; The Salamanders of the family Plethodontidae, Smith College 50th aniv. publ., 1926, pp. 357-360, fig. 57, map (*part.*); Wolterstorff, Abh. Ber. Mus. Nat. Heimatk. Naturw. Ver. Magdeburg, band, VI, Heft. 2, 1930, p. 146.

This, one of the most striking species of the Mexican salamander fauna, enjoys a wide distribution on the plateau region, but apparently occurs sporadically. A series of specimens (Nos. 3973-3994) in the collection was taken by Hobart M. Smith and David Dunkle near Belen, 40 kilometers north of Teocaltiche, Jalisco, July 22, 1934.

Description of the species. (From EHT-HMS. No. 3981 ♂.) Large species with robust body; seen from above the head is truncate oval, flattened; eye large, longer than the snout, but about equal to its distance from the tip; the posterior parts of eyelids inserted under a fold; a groove from behind eye which joins the first gular grooves; latter short, not joining in the middle of throat; gular fold present, prominent; 13 costal grooves; three costal folds between adpressed limbs; limbs well developed, the toes, in descending order of length, 3, 4, 2, 5, 1; both fingers and toes somewhat webbed at base, flattened; tail longer than body, somewhat circular, with a basal constriction; anal lips lined with papillae (male); vomerine teeth in two elongate series, curving back strongly, medially, extending outward beyond the outer level of choanae in a straight line; series narrowly separated medially; parasphenoid teeth in two series more or less contiguous anteriorly, but separated from each other most of their length; separated from the vomerine series by a distance of little more than the width of a choana.

Color. Coal black on back and sides, somewhat grayish black below; two large orange-yellow blotches on back of the head; a somewhat inverted V-shaped spot on neck, followed by paired series of orange spots extending down to and onto base of tail, one pair corresponding to a costal fold.

Measurements of Oedipus bellii (Gray) (in mm.). Snout to vent, 93; snout to gular fold, 21; snout to foreleg, 29; axilla to groin, 53; head width, 14.5; foreleg, 21.5; hind leg, 22; head width in head-body length, 6.4 times; head length in head-body length, 4.6 times.

Remarks. A very young specimen (No. 3992), (19 mm. from snout to vent) shows only a suggestion of the dorsal coloration, many of the dorsal spots being missing; No. 3993 is practically the same. No. 3984 (45 mm.) has many of the orange spots missing on the right side, a few on the left side.

For the most part the specimens conform to the coloration and marking of the specimen described. Specimens from Guerrero, Hidalgo, have much thicker tails. The apparent differences may be due to different methods of preservation.

Distribution. Known from Jalisco, Nayarit, Michoacán, Guerrero, Oaxaca, Veracruz, Guanajuato, Querétaro, Hidalgo, and Distrito Federal. Certain records of *O. bellii* for Veracruz are referable to another species.

Larger series of this species will doubtless permit the separation of certain subspecific groups in this widespread form. The record of this species from Fort Whipple, Arizona, 3 specimens should be questioned. (Listed by Dunn, 1926, and apparently doubted by him.)

Oedipus giganteus sp. nov.

(Plate XXVII, figs. 3, 4)

1883. *Spelerpes bellii* Brocchi (*part.*), Mission Scientifique au Mexique et dans l'Amérique Centrale, Etude des Batraciens, Livr. 3, 1883, pp. 110-11, ? pl. XX bis, fig. 2.

1926. *Oedipus bellii* Dunn (*part.*), Salamanders of the Family Plethodontidae, Smith Coll. Publ., 1926, pp. 357-360 (certainly MZC specimens Nos. 8434-8437, perhaps others).

Type. MCZ, No. 8435, Jalapa, Veracruz, Dr. E. R. Dunn, collector ("under rocks, around the roots of trees in comparatively open pastures").

Paratypes. MCZ, Nos. 8434, 8436, 8437. Same collector and locality; EHT-HMS, 12040, 12085, Cofre de Perote, Veracruz, Elev. 10,000 feet.

Diagnosis. The largest species of the genus, related to *Oedipus belli*, but differing in larger size, proportionally shorter axilla to groin measurement, and proportionally greater head width; pits on head well developed; large orange spots absent on occipital region; adpressed limbs separated by one fold or less in males, in the large female by three folds; a median pit in roof of mouth between choanae; vomerine teeth, 25-25; maxillary teeth, 47-45 in males; 4 premaxillary teeth pierce the lip in males; 68-72 maxillary-premaxillary teeth in female; 62-62 mandibular teeth in males; parasphenoid series fused together anteriorly, diverging strongly posteriorly.

Description of the type. Adult male. Head broader than neck;

snout truncate, the nostrils widely separated; subnarial swellings very moderate; interorbital region somewhat depressed, flattened; eye (4.9 mm.) about equal to length of snout (4.8 mm.); smallest interorbital distance (4.2 mm.) about equal to width of eyelid; width between nostrils, 7.8 mm.; width of head (17 mm.) contained in distance between snout and posterior part of vent (110 mm.), 6.4 times; head length (19 mm.) in same distance, 5.8 times; dorsal surface of head and eyelids with well-developed pits, closely placed, giving the skin a somewhat corrugated appearance; posterior corners of eyelids fitting under a diagonal fold of skin; maxillary teeth, 47-45; premaxillary teeth, four visible, piercing upper lip; mandibular teeth, 62-62; vomerine teeth in two arched series of 25 teeth each, separated medially by a distance less than width of choanae, extending much beyond choanae; parasphenoid teeth in two groups, contiguous anteriorly, diverging posteriorly (length of series, 8.5 mm.; posterior width, 6 mm.) separated from vomerine series by a distance more than a third the distance between choanae. A very large hedonic gland on chin, 8.2 mm. wide.

Skin of body smooth dorsally and ventrally, slightly wrinkled laterally, the pits more or less evident over most of body; costal folds, 11, not counting an axillary which is not apparent in specimens examined; a strong fold on neck, with lateral grooves which meet at an angle on neck; vertical groove at angle of mouth which can be traced across throat; a strong longitudinal fold from eye to nuchal groove; tail subcircular in outline not, or scarcely, compressed, the vertical grooves on sides fairly distinct (22 in evidence), the dorsal surface corrugated and roughened, below perfectly smooth; the complete but dis severed tail measures 110 mm., which is exactly the measurement from tip of snout to the back part of vent. (In younger specimens tail distinctly shorter than body, and distinctly compressed laterally, with tail strongly constricted at base.) Glandular spot present behind insertion of femur; limbs heavy, the digits terminating in the calloused tips which give them a somewhat truncate appearance; ascending order of size of fingers, 1, 4, 2, 3; fingers free save for a very minute but distinct web; first finger smallest and very short but definitely extending beyond web; order of size in toes, 1, 5, 2, 4, 3; first toe is very narrow and short, only extreme tip free. Arm brought forward; the longest finger reaches the posterior corner of eye; when limbs are adpressed the toes are separated by the width of a costal fold (in large female by about three folds); lateral fold caused by extension of a hyoid cartilage

terminates at about third or fourth costal fold; sides of anal slit, with numerous papillae (in females sides of slit folded).

Color in alcohol. Above slaty to grayish-black, of a somewhat lighter shade below and somewhat darker laterally; a small V-shaped orange spot behind the groove crossing neck followed by 15 pairs of orange spots on back which terminate abruptly at tail; latter uniform gray slate; tips of digits somewhat lighter than remainder of hands and feet.

Variation. In MCZ 8436 ♀ the dorsal spots are less distinct posteriorly and are smaller throughout with less definite outlines; there are traces of yellow flecks anterior to the dorsal nuchal groove, while dorsal and lateral surfaces of the head have numerous brown spots; a few spots evident on back. A younger specimen, MCZ No. 8437, likewise shows the minute brown spotting. This latter specimen has the first three orange spots on each side confluent and the pairs of dorsal spots are closer together, anteriorly, than in type; the dorsal ground color has more brown and the ventral surface is a dull grayish-brown. The pigment is less dense on venter, showing a cream ground color, especially under hind limbs. The tail, however, is slate-black above and below in sharp contrast to body color. A young specimen (MCZ 8434) has the entire dorsal series more or less confluent, forming two irregularly-edged stripes on the back. In a very young specimen, EHT-HMS No. 12085 (snout to vent, 9 mm.), the spotting is scarcely visible; the head is rugose, the color blackish.

Variation in measurements and proportion are shown in the table.

Relationship. The relationship appears to be with *O. bellii*, *O. robustus*, and *O. schmidtii*, the first two being characterized by orange dorsal spots or flecks. It has obviously been confused with *O. bellii* in the literature. The most salient characters by which the two may be separated is the heavier pitting of the skin, weak or wanting in *O. bellii*, the proportionally wider head in specimens of equal length (or very much greater body length in specimens of equal head size); large series of teeth (maxillary, mandibular and vomerine) in adults of *giganteus* and the absence of the large occipital yellow or orange spots. It appears to reach a distinctly larger size than *O. bellii*.

It has been impossible to separate completely the literature references to *O. bellii*, that may refer to this form. I suspect that this species is confined to the eastern part of the plateau, while *O. bellii* has a much wider distribution on the plateau. Specimens mentioned

by Günther (Biol. Cent. Amer. 1901, p. 299) from Omilteme in the Sierra Madre del Sur in Guerrero should be carefully reexamined, since it is possible that still other species are masquerading under this name.

Table of measurements in mm. and data of *Oedipus giganteus*

Number.....	8436	8435	8431	8434	12085
Museum.....	MCZ	MCZ	MCZ	MCZ	EHT
Sex or age.....	♀	♂	♂	♀♂	♀♂
Snout to back end of anal slit.....	128.5	110	73	46	19
Length of snout.....	5	4.8	3.3	3	1.5
Snout to arm insertion.....	38.4	34.2	23	13.5	7
Head length to jaw angle.....	22.5	19	14	10.2	4.5
Head width.....	21	17	12.5	9.2	3.7
Eye length.....	7	4.9	4.4	3.6	1.5
Axilla to groin.....	66.5	56	34.2	22.5	9.5
Arm.....	26-26	24-26	17	12	5.8
Leg.....	26-26	26.5-27	18	12.6	6
Tail.....		*110	54	23.5	11.6
Costal grooves.....	11	11	11	11	11
Legs separated by costal folds.....	3	1	½	0	Overlap one fold. 5
Head width in head-body length.....	6.01	6.4	5.8	5	
Maxillary-premaxillary teeth.....	67-68	49-47	44-44	35-39	
Vomerine teeth.....	29-30	25-25	22-22	16-14†	
Mandibular teeth.....	67-?	62-62	42-43	34-35	

* This dis severed tail is in the jar with two tailless specimens. It appears to belong to No. 8435, but if it should actually belong to the other, No. 8436, it would show that the tail is not as long as body.

† Tooth row very irregular.

Oedipus smithi sp. nov.

(Plate XXV, figs. 5, 6)

Holotype. EHT-HMS No. 3966 ♀, collected by Hobart M. Smith, Cerro de San Luis, 15 mi. N. W. Oaxaca, Oaxaca, Aug. 5, 1935.

Paratypes. 3965-3969 same data as type. Nos. 15616-15641, Cerro San Felipe, 15 mi. N. W. Oaxaca, Aug. 20, 22, 1938, Taylor.

Diagnosis. A large salamander, dark brown above; below slaty gray, with a tinge of red on lighter brown at sides; 13 costal grooves, those in axilla and groin rather indistinct; the edges of the grooves darker so that there appear to be 13 dark vertical stripes on side; 3½ to 4 costal folds between adpressed limbs; vomerine teeth in

two long, greatly curved series of 12-14 teeth, beginning 1.5 mm. behind a line drawn between posterior edges of choanae and curving up and out beyond the outer edges of choanae; parasphenoid teeth in two series, narrowly separated anteriorly, but separated by 1.8 millimeters posteriorly; each series six millimeters long.

Description of type. Head rather broad, lacking canthus; nostrils at tip of snout which is truncate; snout extending slightly beyond mouth (.8 mm.) (in male, 1.5 mm.); upper surface of snout slightly convex; a strong medial groove begins at a point between eyes and passes back on neck; inner border of eyelid bordered by a distinct curving groove; parietal regions swollen strongly; head length in snout to vent length, 5.6 times; head width in snout to vent length, $7\frac{1}{2}$ times; eye to tip of snout (3.1 mm.) much less than length of eye (measured from corners of lids, 4 mm.); outline of upper jaw, slightly undulant, seen from side, not straight; angle of jaw much behind posterior angle of eye, both eyelids fitting under a fold of skin behind; a groove from eye curves back and somewhat down along side of neck to beyond the gular fold; first gular groove rather indistinct, somewhat behind jaw angle; arm well-developed, the digits webbed for nearly a third of their length, the web continued to tips as a slight dermal fringe; the first finger very short, not completely involved in web; the descending order of length of fingers, 3, 2, 4, 1, the second and fourth of nearly equal length; toes with a small web at base, and lateral dermal fringe to tips; 3, 4, 2, 5, 1, the order of length of toes; tail (76 mm.) longer than snout-to-vent measurement (68 mm.), constricted at base, compressed somewhat laterally; anal lips with grooves and folds, without papillae; a well-defined gular fold; vomerine teeth in two curved series each consisting of 12 (13) teeth, curving forward and out beyond outer edge of the choanae, separated by 1 mm. from the parasphenoid teeth; latter in two series beginning at hinder level of maxillary teeth, narrowly separated anteriorly where they are very narrow, widely separated posteriorly where the series is widest; about 19 diagonal rows in each series; 20-22 maxillary teeth; six or seven premaxillary teeth; 24 mandibular teeth.

Color. Above dark brown; sides somewhat yellowish or grayish olive-brown tinged with red in life, with a series of thirteen vertical, blackish bars on side between axilla and groin; chin and under tail cream with a peppering of cinnamon-brown; belly grayish-cream with traces of darker lines following costal grooves; sides of tail with numerous blackish spots; lips and side of neck cream, peppered with cinnamon-brown.

Variation. There appears to be practically no variation of import as regards color and markings; No. 3965 has the lateral vertical black bars continued across abdomen. In the others the ventral bars are only faintly indicated.

All the males have a very clearly defined gland on the anterior part of chin which is flat, somewhat salient, 4.5 mm. long, 5 mm. wide. This is almost without pigment and is in strong contrast to its surroundings. In the males there are 4 to 6 premaxillary teeth which pierce the upper lip; the total number of teeth, however, is about the same as in the female; fourteen is the maximum number of vomerine teeth. The tails on the males are somewhat thicker, heavier and a little shorter; the anal walls are strongly papillate; the snout projects 1.5 mm. beyond mouth in the larger males; the head is proportionally wider in males. The head length, in snout-to-vent length, being 5; the head width in same being 6.3 times, in No. 3970. A semicircular fold under tongue of all.

Table of measurements of *Oedipus smithi* sp. nov.

Number.....	3966	3965	3970	3968	3969
Sex.....	♀	♂	♂	♂	♂
Snout to vent.....	69	69	72	67.5	59
Tail.....	76	70	69.5	70.5	66.3
Head to arm.....	20	22	22.2	21.8	18.3
Head length.....	12	14.5	14.8	15.4	12.5
Head width.....	9	11	12	11.2	9
Arm.....	13.5	13.6	14.9	13.1	13.3
Leg.....	16	15.4	16	16.5	14.3
Axilla to groin.....	39	38.3	42	38.5	33.3
Interorbital width.....	2.5	2.2	2.4	2.2	2
Snout.....	3	4	3.8	3.7	2.9

Remarks. This entire series of specimens was collected by Dr. Hobart M. Smith. The following data are from his diary. Color in life: "Below, dull-colored, slaty-gray; above very dark brown, lighter on sides with a tinge of red. All were found under planks and cut logs, covered with leaves, but never very deeply covered. Forest with many pines and other evergreens, with much moss on the trees—a sort of rain forest, very damp. Taken about 200 feet from the summit of the peak of Cerro de San Luis, about 15 miles (by the road) north of Oaxaca. The elevation must have been about 9,000 or more feet."

Apparently the species is not closely related to any other Mexican *Oedipus*, with the possible exception of *O. sulcatus*, from which it differs in the much larger size, longer tail, larger series of vomerine teeth, a much greater width between adpressed toes and a very distinctly different color pattern. *O. sulcatus* has been reported from Cerro de San Felipe, Oaxaca.

The species is dedicated to Dr. Hobart M. Smith, the discoverer of this form, in recognition of his researches in Mexican herpetology.

Dunn's reference, of 2 specimens from this locality, to *sulcatus* is not wholly conclusive. However, the comparison given is with his description, since I have not seen the type. The feet of Dunn's specimen (U. S. N. M. 47606) differ from Brocchi's figures. (Miss. Sci. au Mexique, Batrach. Liv. 3.1883 Pl. XX, fig. 2.)

Oedipus altamontanus sp. nov.

(Plate XXV, figs. 3, 4)

Holotype. EHT-HMS No. 12245; collected at Lake Zempoala, Morelos, Mexico, Aug. 6, 1936, by E. H. Taylor; elevation 10,500 feet.

Paratype. EHT-HMS No. 12239. Same data as type.

Diagnosis. A medium-sized species with a rather large head; vomerine teeth in two series of 10 teeth rather widely separated medially, curving, extending beyond outer level of choanae; maxillary teeth large, about 22 in maxillary-premaxillary series; mandibular teeth same; hedonic gland on chin of males scarcely discernible externally; arms and legs well developed, touching when adpressed; a trace of a web; 12 costal folds, that in axilla very indistinct. Purplish with cream flecks on body; head width in snout-to-vent length, 6.07; head length in same, 4.7; snout to vent, 48.6 mm.; tail, 47 mm.

Description of the type. Head flat between orbits, but surface somewhat roughened, the snout rounded in dorsal profile; canthus rostralis lacking or greatly rounded; a slight depression from anterior angle of eye toward nostril, below which the lores are more rounded; nostrils almost terminal, the distance between them about equal to the interorbital width; width of eyelid a little less than interorbital distance (equal in paratype); posterior ends of eyelids fitting under a fold; length of eye greater than length of snout; a deep longitudinal groove from eye back to the ends of the well-defined gular fold; first nuchal (or head) groove crosses behind angle of mouth, intersects the longitudinal groove, and is continued

some distance above, not crossing chin below; 12 costal folds, that in axilla dim, none indicated in the groin; a slight indication of a broken median dorsal groove not reached by the costal grooves; 9 costal grooves continue across belly; anal region much swollen, the papillae showing deep in the cloaca; arms and legs strong, elongate; very slight webbing indicated; first finger very short, the tip barely free; fourth finger shorter than second; third much longer than second; first and fifth toes very short on left foot, on right the fifth is considerably more elongated; the order of size is 1, 5, 3, 4, 3. A slight web is indicated; tips of digits swollen on under surface; skin of head pitted, minutely corrugated; on body, back rather smooth, the sides wrinkled, belly smooth with fine transverse grooves or wrinkles; hedonic gland barely visible externally; a small glandular area present behind and a little above insertion of hind leg.

Vomerine teeth in two curved series of 10-11 teeth separated by a distance equal to one and one half times the width of a choanae, extending much beyond outer level of choanae; palatine teeth in two series contiguous anteriorly, diverging and widening posteriorly, separated from the vomerine series by a distance equal to three or four times width of choanae; three or four premaxillary teeth pierce the lip; 22-23 teeth in maxillary-premaxillary tooth series; about same number of mandibular teeth.

Color. Head and body generally purplish-violet with a lighter brownish-lavender clouding along the dorsal surface; cream-lavender on sides; ventral surfaces nearly uniform purplish violet (paratype has creamy flecks on chin and breast, scarcely discernible in type); on the dorsal surface of the proximal parts of the limbs are creamy areas or spots, these are less distinct on the sides and dorsum of the distal part of limbs; lower eyelid grayish.

Measurements (in mm). and data of the type and paratype, respectively. Numbers 12245, 12239; sex, ♂, ♀; snout to vent, 48.6, 40; snout to arm, 15, 14.1; axilla to groin, 27, 23; width of head, 8, 7; length of head, 10.2, 8.5; foreleg, 13, 11.3; hind leg, 16.6, 12; head width in snout-to-vent length, 6.07, 5.7; head length in same, 4.7; 4.7; length of eye, 3, 2.6; length of snout, 2.8, 2; interorbital width, 2.2, 1.9; width of eyelid, 2, 1.9; distance between nostrils, 2.3, 2; snout to gular fold, 11.6, 8.9; tail, 47, (?).

Remarks. This species belongs in the group having fingers nearly free, which includes *leprosus* and *robertsi*, but differs from these species in the larger maxillary teeth; the reduced number in the maxillary-premaxillary series; the longer, stronger limbs; the re-

duced condition of the fifth toe; and the peculiar coloration clearly distinguish this species from other members of the genus.

The specimens were collected at about 10,500 feet elevation. I suspect that it will be found to be a species restricted to the highest peaks in the region.

The types were found on grass which was partly covered by logs. In life the violet-purple color with the cream markings and mottling is very striking.

Oedipus leprosus (Cope)

(Plate XXIX, fig. 2)

1869. *Spelerpes leprosus* Cope (*part.*). Proc. Acad. Nat. Sci. Philadelphia, 1869, p. 105-106 (type description; type locality, Orizaba, Mexico, F. Sumichrast, coll.).

1893. *Spelerpes gibbicaudus* Blatchley, Proc. U. S. Nat. Mus., XVI, 1893, pp. 38-39 (same type as *S. leprosus*).

1926. *Oedipus cephalicus* Dunn (*part.*), The salamanders of the family Plethodontidae, Smith Coll. Publ. 1926, pp. 380-384, (USNM 19255; type of *gibbicaudus*; MCZ 7659 Xometla, Gadow, coll.).

(I have not attempted to allocate all the various literature references to *O. leprosus*, since without an examination of the material on which each report is based such allocation would perforce have to be made largely on conjecture.)

A reëxamination of Cope's type and paratypes of *Spelerpes leprosus* have led to the surprising discovery that no less than four species were present in the original lot. Of the original six specimens, five still remain; the smallest, mentioned in the type description, is lost. ("Like other Mexican *Spelerpes*, this animal seems to pass its metamorphoses early; a young one sent with the adults measures 21 lines [about 46 mm.] in length.")

In the original type description, which is a composite one, Cope designates as a type a specimen whose measurements are given. This specimen now bears the number USNM 19255, and is likewise the type of *Spelerpes gibbicaudus* Blatchley. This name, therefore, is a synonym of *O. leprosus* (Cope).

Among the four remaining, one (now USNM 123591) is a specimen belonging to *Oedipus cephalicus* (Cope). The identity of another (now USNM 123592) is still in doubt. The two remaining specimens still bearing the USNM No. 6340 are conspecific and may belong to an undescribed form.

The exact elevation on Orizaba, at which the type was collected, is not known. Sumichrast states that it was confined to the "Alpine region." I have recently examined a specimen which I believe belongs to this species (MCZ No. 7659, collected by H. Gadow at

Xometla, Camp) which was obtained at an elevation of 10,000 feet on Mt. Orizaba. It presents the following characters:

Adult male. Head not flattened, the dorsal surface of snout curving, sharply truncate in front, somewhat angular, due to moderately prominent subnarial swellings; eyes very prominent; body more or less cylindrical; pitting on skin dim, the skin more or less corrugated; the corrugations distinct behind eye; length of eye (3.2 mm.) a little less than length of snout (3.7 mm.); interorbital distance (2 mm.) about equal to width of upper eyelid (2.1 mm.); distance between nostrils, 3.2 mm.; between choanae, 2 mm.; head width (7 mm.) contained in snout-to-vent length (57 mm.) 8.1 times; head length (11 mm.) in same distance, 5.1 times.

Skin above generally smooth, with very fine, short wrinkles visible under the lens; sides and venter smooth, the 11 costal folds moderately distinct, the axillary and inguinal folds not apparent; a whitish glandular area behind insertion of femur; neck rather constricted (normal?), the nuchal fold present, with lateral grooves meeting at an angle on dorsal side of neck; a groove passing across angle of jaws cannot be traced completely across chin; a well-defined groove from behind eye to nuchal groove; skin bordering this groove somewhat pustular; anal slit bordered with papillae.

Limbs well developed, but separated when adpressed by a distance equal to slightly less than width of three costal folds; ascending order of length in fingers, 1, 4, 2, 3; the digits wide with a distinct but very short web; tip of first finger free; web involves about half of the proximal phalanges and is continued along the edge somewhat on the middle finger; ascending order of size in toes, 1, 5, 2, 4, 3, the web slightly evident, involving half of the proximal phalanges on third and fourth toes; tips of digits moderately inflated, but not widened at tip; arm, brought forward, fails to reach the eye; tail missing. A large hedonic gland on chin 3.2 mm. by 2.5 mm.

Parasphenoid teeth in two groups, separated throughout, diverging and widening somewhat posteriorly; length, 5 mm.; combined posterior width, 2.4 mm., separated from vomerine teeth by a distance equal to half the distance between choanae; 13-14 vomerine teeth in nearly transverse series, curving back slightly, medially, separated by a distance not larger than diameter of choanae; a small pit between choanae; 36-37 maxillary-premaxillary teeth; about four premaxillary teeth pierce lip; 42 mandibular teeth on one side.

Color in alcohol. Above, ground color slate with grayish clouding or blotching on dorsal surfaces and sides; laterally the costal grooves show as brownish lines; uniform slate below; limbs lighter with grayish blotches; underside of hands and feet yellowish-cream; snout creamy with thin scattering of pigment, absent or nearly so on subnarial swelling and lips; lower eyelid cream edged with black; upper eyelid edged with cream; chin largely cream with minute scattering of darker pigment and a cream spot across throat at fold.

Measurements. Snout to posterior border of vent, 57 mm.; snout to arm insertion, 17 mm.; axilla to groin, 30.4 mm.; head length, 11 mm.; head width, 7 mm.; arm, 11.8 mm.; hind leg, 13 mm.

Variation. The description of *Spelerpes gibbicaudus* by Blatchley offers some details on the type of *Spelerpes leprosus* Cope. My examination of the type shows the proximal phalanges of the middle toes and fingers to be involved nearly half their length in the skin (web); the groove behind the eye is only dimly visible. The type description by Blatchley states that the toes are unwebbed. The pitting on the skin is minute and minute wrinkles are visible. Twelve costal folds can be counted; 24 grooves visible on tail; maxillary-premaxillary teeth, 32-32; vomerine teeth, 12-12. Brownish coloration mentioned by Blatchley is apparently due to preservation. Chin cream with a meager scattering of pigment; head lighter than body, the tip of snout nearly all cream; lips cream and eyelids with some cream color; below, brownish slate; grayish on top of tail and dark below.

Measurements (in mm.) of the type of *Spelerpes leprosus* given by Cope (reduced to millimeters); of the same specimen as given by Blatchley in his description of *Spelerpes gibbicaudus*; and my measurements of the same specimen, respectively: Snout to posterior end of vent, 50.8, 46 (may be only to front end of vent), 48.5; total length, 88.9, 85, 87; tail, 38.1, 38.5, 39; axilla to groin, 29.4, 26.3, 31; arm, 10.5, 10, 10; leg, 10.9, 10.7, 11; head width, 7.6, 7, 6.33 (this measurement varies if the mouth, which has been forced open, is not completely closed).

I suspect that the slight differences in measurements are due merely to different techniques in measuring. The specimen now has the tail severed. None of the other specimens in the series approaches closely the measurements given by Cope for the type.*

* Certain workers have stated that they do not believe a type has been indicated by Cope. While I regard the act needless, I hereby designate the presumed type (now, USNM No. 19255) as lectotype.

Oedipus manni sp. nov.

(Plate XXIX, figs. 4, 5, 6)

1918. *Oedipus leprosus* Dunn, Bull. Mus. Comp. Zool., 62, 1918, p. 470. (Harvard specimens 3912-3930), Guerrero, Hidalgo, Mexico.

1926. *Oedipus cephalicus* (part.) Dunn, the salamanders of the family Plethodontidae. Smith College publ. 1926, pp. 380-384 (MCZ Nos. 3912-3929).

Type. MCZ No. 3915, Guerrero, Hidalgo, Mexico; W. M. Mann, collector.

Paratypes. MCZ Nos. 3912-3914; 3916-3927. Michigan U. museum, Nos. 48061-48062, type locality, W. M. Mann, collector; EHT-HMS, Nos. 15656-15657, near Zacualtipan, Hidalgo.

Diagnosis. Belonging in the *cephalicus* group, with well-developed limbs and partially webbed feet. The first finger and toe slightly emergent from the "web"; outer toe extending distinctly beyond the "web"; limbs, when adpressed, separated by about two costal folds; dorsal surface of head with very fine pits; back smooth, the pits obsolete; about 38-44 teeth in the maxillary-premaxillary series of females; 33-35 males; 13-16 vomerine teeth, each series extending beyond nares and curving back to meet at a point medially one millimeter behind their anterior edges; snout moderate in females, sharply truncate with slight emargination, and two greatly-developed subnarial knoblike tubercles in males; head width in snout-to-vent length, $5\frac{1}{2}$ to $6\frac{1}{2}$ times; a groove from eye to gular fold; 12-(13) costal grooves. Black or brownish-black with silver spots or flecks, more prominent on sides and belly; throat black with silver or cream flecks.

Description of the type. Head moderately flattened; eye (3.05 mm.) much longer than length of snout (2.1 mm.), slightly longer than its distance from middle of the tip of snout. Width of an upper eyelid equal to the interorbital distance; distance between nostrils, 2.15 mm.; eyelids with their posterior parts fitting under a diagonal skin fold; very small pits indicated on the top of head, distinctly larger and closer together on eyelids and temporal region; maxillary-premaxillary tooth series, 44-44; 13-14 vomerine teeth, extending beyond the very minute choanae (.018 mm.), curving back and terminating slightly more than a millimeter back of their anterior border; the two vomerine series separated by a distance about equal to the diameter of the choanae; palatine teeth in two club-shaped series scarcely separated anteriorly, but distinctly diverging posteriorly, the total length, 4 mm.; width, 2.4 mm. posteriorly; separated from the vomerine series by a distance of one millimeter; mandibular teeth, about 40-40.

Body apparently somewhat compressed and slightly elevated along middle part of body; 12 costal folds not counting an inguinal fold, which apparently is obsolete or absent; skin on sides wrinkled slightly or minutely corrugated; on back smooth, on belly smooth with fine transverse lines, two or three to each fold; tail rather strongly constricted at base.

The vertical tail grooves are not strongly marked except on proximal portion; tail more or less wrinkled everywhere, somewhat compressed laterally; length of tail about one fifth less than head-body length; limbs moderately heavy, the first toe short, only the extreme tip extending beyond level of web; between the two middle fingers the web includes more than half of the proximal phalanges; fourth finger about one millimeter long; the web appears to continue along edge of digits as a fringe if the hand is slightly dried; fingers, 3, 2, 4, 1 in descending order of size; arm brought forward, the longest finger reaching posterior corner of eye; foot with a distinct web, including half the proximal phalanx of the second and third toes, all of the proximal phalanx of the fourth and fifth toes; first very slightly emergent from web; fifth toe extends beyond web one half millimeter or more; toes, 3, 4, 2, 5, 1 in descending order of size: ad-

Measurements in mm. and data from *Oedipus manni* sp. nov.

Number.....	3915	3920	3925	3916	3923	3912
Museum.....	MCZ	MCZ	MCZ	MCZ	MCZ	MCZ
Sex.....	♀	♀	♀	♂	♂	?
Snout to back end of anal slit.....	53.2	52	46	48	43	39.5
Length of snout.....	2.1	.....	2.2	3	2.7	1.9
Head length to jaw angle.....	10	.....	8.2	8.8	8.2	7.2
Head width.....	8.4	.....	8	7.8	7.4	6.8
Eye.....	3.05	.....	2.9	2.5	3	2.5
Axilla to groin.....	28	30	23.5	22	22	22
Arm.....	12.4	11.2-12	11	13	12	9.8
Leg.....	13.2	12.5-13	11.2	.....	12.3	11.5
Tail.....	41	36	32	40.2	34	27.5
Costal grooves.....	12	13	12	13	12	12
Legs separated by folds.....	2	2½	2	touch	touch	2
Head width in head-body length.....	6.1	.....	5.75	6.15	5.81	56.2
Maxillary-premaxillary teeth.....	44-44	40-?	38	33-35	35-35	34-34
Vomerine teeth.....	13-14	13-13	13-13	?	15-16	15-14
Mandibular teeth.....	40-40	39-40	40-41	42-41	36-35	36-38

pressed limbs fail to meet by a distance equal to width of two folds; anal slit, 4 mm. long, the sides with diagonal folds; a strong gular fold across neck from which ascends a groove which cannot be traced to the dorsal surface; a groove crosses chin and reaches up beyond angle of mouth; a small glandular spot present behind insertion of femur.

Color (in alcohol). Dorsal surface grayish-brown (reddish-brown in life?), the head slightly darker; sides growing slightly darker towards venter; sides with a frosting of silver growing slightly more dense low on side; it is then replaced by scattered flecks and spots of cream or silver on ventral part of body and head; the chin region has the ground color darker and the silver spotting more dense than on abdomen; tail and limbs dark, flecked or spotted with silver; lower eyelid with some cream or yellow color.

Variation. In the paratype series, Nos. 3913, 3917, 3918, 3919, 3921, 3923, 3924, 3926, have been preserved in a different manner from the remainder of the MCZ specimens of the series. The ground color appears to be a deeper black and the frosting of the dorsal surface is obscured. The contrast of the black and silver on the belly is very pronounced. The specimens are somewhat shrivelled (as are specimens placed in too strong a solution of alcohol). The remainder of the series is well-preserved and the general appearance of the specimens (under water) is grayish on the sides and a dull black, grayish-black or grayish-brown along the back; the front borders of the eyelids and the tip of the snout are lighter, and the loreal region slightly darker than remainder of head; lips heavily flecked with whitish silver. The ventral ground color is a dull grayish black with the silver spots and flecks in strong contrast. Tail with silver flecks generally scattered or segregated, leaving large blackish spots (No. 3912) on tail.

The principal differences in the specimens are sexual, the males having a longer, very truncate snout, slightly emarginate when viewed in profile from above; the under side of the snout, which projects strongly beyond the mouth, is concave between the two greatly developed subnarial, knoblike bosses which project at the angles of the snout; the legs are a trifle longer and touch (at least in adult specimens) when adpressed.

A well-developed hedonic gland is present on chin of males. The eye is longer than the snout in females, nearly the same length or shorter in males; anal lips with papilla in male, and the premaxillary teeth (not more than four) pierce the lip. The reduction in

the number of teeth in the adult male is another sexual character. Older females seem to have a larger series of teeth than younger specimens.

Remarks. A male and female of this form (the latter the type) are described as *Oedipus cephalicus* by Dunn (*loc. cit.* 1926, pp. 381-382). The relationship of the species is with *cephalicus*. It differs strikingly in coloration and marking, the color of *cephalicus* being a dull blackish to bluish or grayish slate without distinct markings on body and tail; the tail of *O. cephalicus* is slenderer, less compressed, tapering more gradually and is distinctly longer; the axilla to groin measurement is longer and the limbs likewise longer than in specimens of *O. manni* of the same snout-to-vent length. The subnarial bosses are proportionally larger and the snout narrower and the pitting on head and body less conspicuous in *O. manni*; and the body is slightly compressed and deeper in the middle than in *O. cephalicus*.

The species is named for Dr. W. M. Mann, director of the National Zoölogical Gardens in Washington, the discoverer of the species. I am indebted to Dr. T. Barbour and Mr. A. Loveridge for the privilege of describing the species.

Oedipus orizabensis (Blatchley)

(Pl. XXV, figs. 1, 2)

1910. *Spelerpes orizabensis* Blatchley, Proc. U. S. Nat. Mus., 1893, p. 37 (type description; type locality, Mt. Orizaba, Veracruz, Mexico); Gadow, Proc. Zoöl. Soc. London, 1905, p. 203; Zoöl. Jahrb., 1910, pp. 709, 714.

1926. *Oedipus cephalicus* Dunn, The salamanders of the family Plethodontidae, Smith College Pub., 1926, pp. 380-384 (*part.*).

The species is represented in the collection by the following specimens EHT-HMS, Nos. 4000-4011, 4013-4023, 4025-4116, 4118-4123, 4125-4126, 4128, 4384 (Taylor-Smith), July 30-31, 1932, and 12188-12212, 12214-12216, 12281-12223, 12227, Aug. 12, 1936 (Taylor), between kilometers 58-66, west of Rio Frio, Puebla, elevation, 8,000 to 10,000 feet. No. 12225, near Las Vigas, Veracruz, elevation about 8,000 feet. Sept. 1, 1936 (Taylor). Nos. 4327-4367, 4378-4379, July 19, 1932 (Taylor and Smith), and 12044, 12045, 12048-12051, 12054, 12056-12058, 12062-12064, 12066, 12068, 12070, 12075, 12078-12080, 12083-12084, 12086, 12088, Sept. 2, 1936 (Taylor), Cruz Blanco and slopes of Cofre de Perote up to about 11,000 feet. Nos. 12099-12108, 12110-12113, 12115-12118, 12121-12122, 12232, 12235, 12236, 12241, 12244, 12247-12252, 12255-12257, 12259, 12263, 12265, 12266, Lake Zempoala, Morelos, 10,000 feet, Aug. 6, 7, 1936 (Taylor). Nos. 12267-12268, 12412, 12415, 12416, in a pedregal, at kilometer 35

on road between Mexico City and Tres Cumbres, Morelos, July 8, 9, 1936 (Taylor and Smith).

Diagnosis. A grayish-black, medium-sized species with a tendency to grayish clouding on back; chin lighter; head flat; no canthus; palatine teeth in two slightly diverging series; separated from the vomerine teeth (rarely continuous); vomerine teeth, 12-17 in a curved series extending beyond choanae; adpressed limbs separated by from $1\frac{3}{4}$ to 4 costal folds; costal folds, 12-13; tail as long as head and body in adults; a small gland (appearing as a whitish spot) behind and slightly above the hind limb; head width in snout-to-vent length (above 50 mm.), about 7.5; head length in same, about 6 times. Hedonic gland on chin in males; the subnarial swelling much smaller than in *O. cephalicus* males, or *O. leprosus* males.

Description of the species. (EHT-HMS No. 12049 ♀, slopes of Cofre de Perote near Cruz Blanca, Veraacruz; Taylor-Smith, collectors.) Head rather flat in occipital and interorbital regions, rounding on snout; no canthus present; snout bluntly oval, the swellings below nostrils scarcely discernible; length of eye (2.5 mm.) greater than length of snout (2.1 mm.); upper eyelid (1.8 mm.) less than interorbital distance (2.3 mm.); distance between nostrils, 2 mm.; head width in snout-to-vent length, 7.2 times; head length in same, 6.4 times.

Thirteen costal folds, those in axilla and groin distinct; a discontinuous groove along middle of back not reached by the costal grooves; first gular groove crosses angle of jaw from about upper level of eye, and just fails to meet its fellow in middle of throat below; nuchal fold with irregular grooves arising from its ends which reach the median line forming an angle, pointing forward; a deep groove behind eye intersects the first gular groove and passes back, becoming continuous with the gular fold; costal grooves continued across belly; caudal grooves very distinct in adults; adpressed limbs fail to meet by a distance equal to about four costal folds; digits slightly webbed, the first very short with a free tip; the second is a trifle longer than fourth, the third longest; finger margined with a discernible fold of skin, and the ventral surface of the tip is padded; toes in the following ascending order of size: 1, 5, 2, 4, 3.

End of part of the larynx apparatus causes a prominent, elongate raised area from gular fold, passing along the shoulder to a point some distance behind the arm; a glandular area behind and somewhat above the insertion of leg; skin of head thickly and regularly pitted as is the skin of dorsal and lateral parts of body; ventral surface with very minute pits.

Vomerine teeth in two series of 14-15, narrowly separated medially, curving, extending far beyond outer level of the choanae, separated from the palatine teeth by a distance equal to four or five times the diameter of the very small choanae; palatine series distinctly separated, diverging posteriorly the space between their posterior ends nearly double the width of one series; about forty maxillary teeth, those on premaxilla alternately large and small; 41-42 mandibular teeth.

Color. Generally grayish-black to slate, flecked or clouded above on body and tail with grayish-brown, and on sides with grayish-cream; below plumbeous, the throat and chin yellowish-white with scattered peppering of black; lower eyelid whitish; a cream mark on the tip of snout resembling an inverted U or V; gland behind and above insertion of hind leg grayish; underside of hands and feet dirty whitish; tiny arrow-shaped cream spots near the tips of the digits.

Table of measurements (in mm.) and data on *Oedipus orizabensis* Blatchley

Number.....	4000	12048	12049	12268	4379	12059	4024
Sex.....	♀	♀	♀	♀	♂	♂	♂
Snout to vent.....	55	57.5	51	56	53	52	45.4
Snout to foreleg.....	14.9	15.8	14	15	15	16	14
Axilla to groin.....	35.6	34.5	30	33.8	32.2	28	27.5
Head width.....	7.3	7.2	7	7.2	7	7	6.5
Head length.....	9.1	8.3	7.9	9.2	8.7	8.9	7.8
Tail.....	45	51	51	55	53.3	54	51
Arm.....	10.5	11.4	8.5	11.7	11.5	10.8	11
Leg.....	10.5	12	10	12	13.4	12.3	11
Vomerine teeth.....	17-17	13-14	14-15	15-17	12-13	13-13	13-13
Costal grooves.....	13	13	13	13	13	13	13
Head width in lgth. (times),	7.5	8	7.28	7.7	7.5	7.4	7
Head length in lgth. (times),	6.04	6.9	6.4	6.1	6.1	5.9	5.8

Variation. Some variation is observable in the number of vomerine teeth and the relation of the series to the palatine teeth. The maximum number of vomerine teeth observed was 17, and in this specimen, EHT-HMS 4000, the palatine and vomerine series were practically continuous. One other specimen had one or two teeth between the median ends of the vomerine series, making them practically continuous. The palatine series are about 5 millimeters

long. In EHT-HMS 4067 the series are together anteriorly and diverge posteriorly the width of one series.

Males have a well-developed hedonic gland on the tip of the chin; the premaxillary teeth (usually 2) pierce the lip, and occasionally are visible when the mouth is normally closed.

Specimens from Cruz Blanca and the slopes of Cofre de Perote often have brownish flecks and clouding on the dorsal surface of back and tail and the digits are a trifle larger, the hand and foot having a little more width; the light figure on the snout is distinct and in young the tip may be largely cream. The sides are often "frosted" with silver. Specimens from the region near Rio Frio, Puebla, have the dorsal surface of the tail with heavier clouding of cream and the snout marking is discernible only in younger specimens. Those from the Ajusco mountains (region of Tres Cumbres and Lake Zempoala) are more plumbeous, the light markings on the tail not so well pronounced; the dorsal and lateral silvery clouding is rather equally distributed.

The head width and length, in the snout-to-vent length, varies with the age and length. The head is contained a fewer number of times in younger specimens. The number of folds between the adpressed limbs is likewise variable with age. The axilla-to-groin measurement is greater in females containing eggs. Tails in younger specimens vary, being shorter than head and body. There is much variation in the thickness of the tails of preserved specimens. This is due to the amount of secretion from the tail.

Remarks. This species may be readily distinguished from *Oedipus cephalicus* by the larger feet and hands of that species, with their greater amount of webbing. Differentiation from *O. altamontanus* and *O. leprosus* is discussed under those species.

This seems to be one of the most common species in Mexico. The number of individuals taken is exceeded only by the smaller *O. chiropterus*. They are found together on the forest floor, under logs and debris.

I refer the following MCZ specimens to this species: Nos. 8404, 8417, 8418, 8420, 8421, 8423, 8426, 8427, 8431, all from Popocatepetl volcano, Mexico.

Oedipus cephalicus (Cope)

(Plate XXVI, figs. 3, 4)

1865. *Spelerpes cephalicus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 196 (type description; type locality, "Mexican Tableland," Dr. C. Sartorius, coll.); and 1869, p. 106 (listed only "N. E. Mexico") Sumichrast, La Naturaleza, 1882, p. 79 (listed); Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 8 (listed only); Boulenger, Cat. Batr. Grad. s. Caud. British Mus., 2d Ed. 1882, pp. 67-68 (redescription from Cope); Brocchi, Mission Scientifique

au Mexique et dans l'Amérique Centrale; Etude sur Batraciens, Livr. 3, 1883, p. 109 (by description from Cope); Cope, Bull. U. S. Nat. Mus., No. 31, 1889, p. 162 (key); Günther, Biologia Centrali-Americana, Rept. Batr., Dec., 1901, pp. 298, 229 (description after Cope); De Leon, Indice de las Batracios que se encuentra in la República Mexicana, 1904, p. 38 (list); Cope, Amer. Nat., Dec., 1896, p. 1022 (distribution).

1924. *Oedipus cephalicus* Dunn, Field Mus. Nat. Hist., XII, 1924, pp. 99-100 (key) (*part.*) and Salamanders of the family Plethodontidae, Smith Coll. Publ., 1926, pp. 380-384 (*part.*); and Proc. Acad. Nat. Sci. Philadelphia, 88, Oct. 20, 1936, p. 471 (Pablillo, Nuevo Leon);? Wolterstorff, Abh. Ber. Mus. Nat. Heimatk. Natur. Ver, Magdeburg, Bd. VI, Heft. 2, 1930, p. 146.

Cope has said of this species: "The form of the present species is more that of *Ambystoma opacum*, and is the shortest and stoutest seen in the genus." The type has been lost and most of the specimens listed by Dunn (1926) as *O. cephalicus* apparently belong in other species.

The species is represented in our collection by a series of more than fifty specimens, with a range including Hidalgo, Central Veracruz, Morelos, and Puebla, as follows:

EHT-HMS. Nos. 4117, 4313-4326, Cruz Blanca, Veracruz north side of Cofre de Perote, 8,000 feet, July 13, 1932, Taylor and Smith; 4368-4370 near Tres Cumbres, Morelos (km. 35 on highway) July 11, 1932, Taylor and Smith; 4371-4375 Cruz Blanca, Veracruz, July 18, 1932, Taylor and Smith; 4534-4540, between Rio Frio and Puebla, Puebla, July, 1932, Taylor and Smith; 4012, Rio Frio, Puebla, July, 1932, Taylor; 12092-12095, 12098, 12097, 12260, 12493, Lake Zempoala, near Tres Cumbres, Morelos, 8,500 to 10,000 feet, Sept. 4-6, 1936, Taylor; 12269-12270, 12413, km. 58, near Tres Cumbres, Morelos, July 10, 1936, Smith and Taylor; 12495, near Minas Viejas, 7,000 feet, near Jacala, Hidalgo, on highway, July 5, 1936, Taylor; 12042, 12052, 12059, 12065, 12067, 12073, 12077, 12081, 12123, 12089, 12224, above Cruz Blanca on north side of Cofre de Perote, Veracruz, in pines, elevation 8,000-10,500 feet, Sept. 2, 1936, Taylor.

Cope's description contains the following data: "Muzzle rounded, truncate, with obtuse angles at the nares, its length from line connecting anterior canthus oculorum equal length of eye. Distance between these canthus equal from hinder canthus to nares. Breadth behind orbits equal length of tibia and foot. Muzzle to axilla equals $\frac{2}{3}$ distance from axilla to groin. Costal folds (*i. e.*, dorsal and lumbar vertebrae), eleven. Tail swollen, little compressed, constricted at base. Posterior limb stout, extending to sixth fold from behind; toes flat, depressed, margined, inner very rudimental. Inner and outer digits of anterior limb similar; the longest extend to near the middle of orbit. Series of vomerine teeth nearly straight, not in contact; a postgular fold. Skin everywhere finely wrinkled. Color dull black, paler on the sides, lips and gular region minutely marbled with ashen. *Length of rictus oris, 2.75 lines [6.3 mm.];

* I am designating EHT-HMS 4372 as a neotype, since (*vide* Dunn 1926) the type is lost. The designated specimen is practically the same size as the type. The measurements corresponding to the above are, respectively, 6.2 mm.; 15 mm.; 37 mm.; 33.8 mm.; 11.3 mm.

length to axilla, 6.8 lines [15.6 mm.]; length to groin, 16 lines [36.8 mm.]; length of tail, 15 lines [34.5 mm.]; length of hind limb, 5.2 lines [11.9 mm.].

Description of species. (From EHT-HMS No. 12098 ♀, collected Lake Zempoala, Morelos, Aug. 5, 1936, E. H. Taylor, collector.) Head flat, the canthus well defined in front of eye, but becoming rounded and disappearing near nostril; snout sharply truncate, extending a very short distance beyond mouth; tubercular swellings below nostril near lip; length of eye slightly longer than snout; interorbital distance one and one half times the width of eyelid; distance between nostrils about equal to greatest width of an eyelid; posterior edges of upper and lower eyelids pass under a diagonal fold; posterior line of mouth turns up at rictus; first nuchal groove begins on sides of head, passes down and completely across throat; a strong nuchal fold, the grooves from the two sides continuing up on dorsal surface, where they meet at an angle, directed forward; 12 costal grooves, the axillary and inguinal rather dim; skin between folds forming numerous longitudinal wrinkles (tail somewhat shrivelled due to excessive secretion of mucous; in life tail rather plump); tail distinctly constricted at base; the vertical grooves very indistinct on tail; costal grooves discernible across belly; skin on dorsal and lateral surfaces and on breast strongly pitted.

Limbs well developed, the anterior brought forward, the finger reaches to near middle of eye; adpressed limbs separated by less than two folds (about $1\frac{1}{2}$ to $1\frac{2}{3}$ folds); fingers and toes partially webbed, this webbing much thickened, the digits themselves flattened and more or less definitely margined; first finger much smaller and shorter than fourth; ascending order of length of fingers, 1, 4, 2, 3; of toes, 1, 5, 2, 4, 3; walls of cloaca heavily folded at anal opening; head width in length (snout-to-vent), 5.9 times; length of head, in same, 5.3 times.

Vomerine teeth in two nearly straight series of 15-18, which become slightly curved medially, not meeting on median line, the teeth somewhat irregular; palatine series about 5 mm. long (abnormally short on right side), the groups not tending to diverge posteriorly; separated from the vomerine teeth by a distance equal to four times the diameter of the very small choanae; vomerine teeth extend much beyond the outer edges of choanae; maxillary premaxillary series, 39 on each side; 42-45 mandibular teeth.

Color. Blackish or grayish-black above and below, with some lighter flecks on chin, the flecks less noticeable on abdomen; the un-

derside of tail flecked and clouded with lighter color; upper side of tail with occasional, very indistinct brownish flecks.

Measurements of *Oedipus cephalicus* Cope

Number.....	12098	4368	12242	4369	4372*
Sex.....	♀	♂	♀	♂	♀
Snout to vent.....	53	52.2	57	60.2	40
Tail.....	50	52	50	55.5	33.8
Snout to arm.....	16.5	16	16.5	18	13.5
Axilla to groin.....	33.1	29.5	35.2	35.2	23
Width of head.....	9	8.5	9	9.2	7.4
Length of head.....	10	10	10	11	7.1
Eye.....	3	3	3.5	3.4	2.1
Eyelid.....	2.7	2.7	2.7	2.3	2
Snout.....	2.9	3.5	2.8	3.2	2.2
Interorbital width.....	3.1	3.1	3	3.2	2.2
Arm.....	13.1	15.5	15	15.3	10.9
Leg.....	16	16.2	16.1	18	11.5

* 4372 is designated the neotype.

Variation. The table shows variation in measurement. The tail is proportionally shorter in younger specimens. Males differ in having 33-34 maxillary teeth, with three or four premaxillary teeth piercing the lip; 39-42 mandibular teeth; snout longer than eye; the swellings below nostril are greatly inflated, and the snout projects more beyond mouth; adpressed limbs touch or are more narrowly separated than in females; males have a flat gland near tip of chin, and the webbing of the toes is somewhat greater. The smallest specimen, 18 millimeters, snout-to-vent, has the head greatly roughened, as do others up to 25 millimeters length.

Remarks. The specimens were found under logs, usually not directly on the earth but on grass or other trash. When captured, they exuded much mucous secretion, and again this was done when they were placed in alcohol for killing. The result is that the tails of all the specimens look shrivelled. The silvery flecks on the ventral surface are occasionally distinct in life, giving the belly a frosty appearance; this disappears in preserved specimens.

From the various localities there were observable some slight differences in the webbing of the digits and the spread of hand and foot. When males and females of equal length are compared the male usually has slightly larger feet and hands.

I have examined certain salamanders in the United States National Museum and specimens from the Museum of Comparative Zoölogy, Harvard College. I am referring the following specimens to this species: MCZ Nos. 8408, 8419, 8424, 8428-8430. 9,000 feet Popocatepetl, Pue., MCZ 8376, Jalapa.

Oedipus robertsi sp. nov.

(Plate XXVI, fig. 2)

Holotype. EHT-HMS, No. 12503, collected Nevada de Toluca, elevation between 10,000 and 11,000 feet, Sept. 7, 1936; H. Radclyffe Roberts, collector.

Paratypes. EHT-HMS, Nos. 12496-12498, 12504-12505, collected same date and locality by Philip Powers, Edwin R. Helwig, Radclyffe Roberts and Edward H. Taylor; Nos. 15600-15615, topotypes, Taylor.

Diagnosis. A medium-sized species related to *O. orizabensis* and *O. leprosus*, but differing in having a somewhat more robust body, with a broad, orange stripe on the back and tail, much larger limbs and toes, the latter lacking any trace of a web; adpressed limbs in contact or separated by a part of one costal fold; tail shorter than or almost equal to head and body length; vomerine teeth, 8 or 9 in a curved series; 13 costal grooves (counting one in axilla which is very indistinct); head length in head body length, 5.7 times; head width in same, 6.2 times.

Description of type. Head broad, rather flattened; no trace of canthus; snout truncate, the nostrils very close to anterior point; snout extending beyond mouth .5 to .7 millimeters; a rounded swelling below nostril near lip; interorbital width equals distance between nostrils, a little greater than width of an eyelid; length of eye about one fifth longer than snout; upper surface of head, between eyes and on the region behind eyes, flat; occipital region not, or but slightly, swollen; a strong nuchal fold across the ventral surface of the neck; a groove from this to dorsal surface, where it runs forward somewhat, joining the groove from the opposite side; a short, vertical groove on side of head crosses angle of jaw somewhat back of the angle of the mouth and continues on the side of head to dorsal surface; a groove from behind eye crosses this groove and continues back to the nuchal groove, where it terminates; 13 costal grooves, that in axilla very dim; area between grooves very wrinkled, the upper edge of the wrinkled area suggestive of discontinuous sinuous, longitudinal groove; tail constricted at base,

the folds between the caudal grooves wrinkled; tail compressed laterally; length of head in snout-to-vent length, 6.2 times; outline of edge of upper jaw almost straight; posterior ends of both eyelids fitting under a fold of skin.

Limbs well developed, when adpressed, the digits separated by a distance of one costal fold or less; no trace of webs; digits flattened, save at tip, which is definitely inflated and rounded; first finger very short, its tip free; ascending order of length of fingers, 1, 4, 2, 3; of toes, 1, 5, 2, 4, 3; skin on dorsal surface of head and body more or less minutely pitted; tail a little shorter than head and body.

Vomerine teeth in two slightly curved series of 8 or 9 teeth, extending beyond the outer edges of choanae, separated from each other by a distance one and one half times the width of a choana; palatine teeth in two series, very narrowly separated anteriorly, and diverging somewhat posteriorly; 19-20 maxillary teeth; 4 or 6 premaxillary teeth.

Color. Above a broad, variegated, orange-reddish stripe from head to tip of tail; sides somewhat brownish lavender; below lead color (specimen is now somewhat discolored and is quite deep brown on sides and abdomen), a few spots of orange-brown on head and along sides. Underside of hands and feet immaculate.

Measurements of *Oedipus robertsi* sp. nov.

Number.....	12503	12497	12504	12505	12498	12496
Sex.....	♀	♂	♀	♀	♀	♀
Snout to vent.....	51	48.8	47.4	36.5	38.1	34.5
Head length.....	8.2	9.4	9.2	7.5	7.6	7.2
Head width.....	8.9	7.8	7*	6	6.5	6
Snout to arm.....	17.2	15	15	11.4	12.9	10.5
Axilla to groin.....	30	29.2	26.3	22.2	22.6	20.3
Interorbital width.....	2.9	2.6	2.9	2	2.2	2
Eyelid.....	2.3	2	2.1	1.8	1.5	1.5
Eye length.....	3	3	2.5	2.5	2.5	2.1
Snout.....	2.3	2.4	2.6	2	2	1.9
Tail.....	44.8	48.5	47	33	33.5	30

* Injured.

Variation. In most of the characteristics the paratypes agree with the type. In the younger specimens the digits touch when adpressed and the tail may equal the length of head and body. The dorsal stripe may break up into spots on the tail. A male (No. 12497)

differs in having a larger swelling below the nostrils, the snout slightly more truncate, and a well-defined gland on chin near tip of the lower jaw; the premaxillary teeth (4) pierce the upper lip and the anal slit has the wall papillate instead of folded as in the female. The stripe may be brown or fawn.

Remarks. The specimens were found at an elevation between 10,000 and 11,000 feet, along the road leading to the summit of the volcano, Nevada de Toluca. They were found for the most part under stones, in the pine forest.

The species is dedicated to Mr. Radclyffe Roberts, of the Philadelphia Academy of Sciences, who assisted in collecting the types and made possible the journey to the mountain.

Oedipus multidentata sp. nov.

Oedipus chiropterus Dunn, Acad. Nat. Sci. Philadelphia, 88, 1936, p. 471.

Type. MCZ, No. 14812, ♂; Alvarez (km. 53 on Potosi y Rio Verde R. R.), San Luis Potosí, Mexico, elevation 8,000 feet, W. W. Brown, collector.

Paratypes. MCZ, Nos. 14810-14811. Topotypes. Brown, collector. UMMZ, Nos. 63946, 63948, 63953; EHT-HMS, 15658-15848, El Chico, Hidalgo.

Diagnosis. A small species related to *Oedipus chiropterus*, but differing in having longer and larger limbs and feet which touch or overlap when adpressed, tail somewhat more attenuated; eye somewhat larger, and head slightly more flattened; adult males with the maxillary-premaxillary tooth series 20-24 in each half of jaw (in *O. chiropterus* usually 6-6), and the teeth appear to be stouter than the teeth in the females of *chiropterus*. The vomerine series assume a more transverse position, and the choanae are somewhat larger.

Description of the type. Head rather flattened; eye (2.5 mm.) slightly shorter than snout (2.7 mm.); distance between nostrils, 2.15 mm.; smallest interorbital width (2.1 mm.) is greater than width of an upper cycloid (1.7 mm.); width of head (6.2 mm.) contained in distance between snout and posterior end of vent (39.5 mm.) 6.37 times; head length (8.5 mm.) in same distance, 4.64 times; line of mouth diagonal and somewhat undulant posteriorly; subnarial swellings prominent, giving the snout a slightly angulate appearance; snout truncate with a faintly indicated canthus, below which is a very slight depression extending from eye toward nostril; hedonic gland on chin indistinct. Vomerine teeth, 7-8, extending near to outer edge of choanae, nearly transverse, but forming an

angle posteriorly, the series separated by a distance a little less than diameter of a choana; parasphenoid teeth in two distinct series, widening posteriorly and diverging slightly posteriorly, separated from the vomerine series by a distance equal to two thirds the distance between choanae; maxillary teeth extending back past the middle of the eye; premaxillary teeth somewhat more elongate and slenderer, none piercing the lip but extending outside the lower lip, the combined maxillary-premaxillary series 24-24; mandibular teeth large, 24-26, fitting distinctly within the upper series.

Skin of head rather heavily pitted (in the type the epidermis has been recently shed and this character is not obvious); a strong nuchal fold curves across throat and from its edges arise grooves which ascend the side of neck; on the occiput the musculature causes ridges and grooves in the skin; two prominent ridges converge on the back part of head with a distinct median groove between them which continues along the dorsal surface of the body and tail; two grooves pass back irregularly to join the nuchal groove; these are traversed by a groove which crosses throat and passes upwards behind, or across, angle of mouth; eleven costal grooves, the axillary and inguinal grooves not indicated (somewhat apparent in a paratype).

Skin of the dorsum not strongly pitted; on the tail, the pits are similar to those on the head; tail very slightly constricted at base; about seven or eight vertical grooves indicated, these near the base; tail 52 mm. long, more than a fourth longer than head and body.

Fingers, 1, 2, 4, 3, in ascending order of size, the inner greatly reduced and wholly included in web; web includes most of the proximal phalanx of the second and fourth and extends to and includes a part of the second phalanx on the third digit; terminal part of digit very slightly spatulate; toes, 1, 5, 2, 4, 3, in ascending order of size, the first included in web; web includes all of the proximal phalanx and part of adjoining phalanx of the four outer digits; pads under tips of digits prominent; limbs when adpressed overlap the width of one fold; a small glandular spot behind insertion of femur.

Color in alcohol. Above, nearly uniform brown save that the lower eyelid is yellowish or cream and a minute touch of lighter color present at tip of snout and on the subnarial swellings; below, brownish, of a very much lighter shade; chin and under hands and feet brownish white.

Measurements, in millimeters, and data on Oedipus multidentata. Type and paratypes. MCZ Nos. 14812, 14811, 14810, respectively.

Sex ♂, ♂, yg.; snout to vent, 39.5, 31.5, 24.1; length of snout, 2.7, 2.3, 1.7; snout to arm, 13, 10, 1.5; axilla to groin, 20.4, 15.2, 13.5; tail, 52, 40, 29; head width, 6.2, 5.2, 4.4; head length to jaw angle, 8.5, 7, 5; forearm, 10, 10, 7; leg, 12.1, 10, 7.1; head width into head-body length, 6.37, 6, 5.4 times; head length into head-body length, 4.6, 4.5, 4.8 times; maxillary-premaxillary teeth, 24-24, 21-21, 23-23; vomerine, 7-8, 6-5, 6-6; mandibular series, 24-24, —, 23-22.

Variation. Practically no variation is evident save that recorded above. The amount of overlapping in adpressed limbs is less in smaller specimens.

Remarks. As stated, this species is most closely related to *Oedipus chiropterus*, and resembles the latter rather strongly. The large number of teeth, typical of the females of *chiropterus*, are present here in the males. The males of *chiropterus*, in the adult condition, have no posterior maxillary teeth, and those that are present anteriorly are larger than the teeth in the female. The sexual dimorphism in *chiropterus* is striking as regards dentition.

Oedipus chiropterus (Cope)

1863. *Spelerpes chiropterus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1863, p. 195; (type description; type locality, Mirador, Veracruz, Mexico. Dr. Sartorius, collector); and, 1869, p. 106; Boulenger, Cat. Batr. Grad. s. Ecaud. British Mus., 2d Ed., p. 67; Brocchi, Mission Scientifique au Mexique et dans l'Amérique Centrale, Etude sur Batraciens, Livr. 3, 1883, p. 109; Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 8; and No. 34, 1889, p. 162; Dugès, La Natureza, 1896, (2), 2, p. 482; Günther, Biologia Centrali-Americana, Rept. and Batr. 1902, p. 298; Gadow, Proc. Zool. Soc. London, 1905, p. 203, and Zool. Jahrb., 1910, p. 714.

1865. *Spelerpes orculus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 196 (type description; type locality, Mexican tableland and southern mountains); Herrera, La Natureza (2), 1, p. 340; and 1892, p. 49.

1924. *Oedipus chiropterus* Dunn, Field Mus. Nat. Hist., Zool. Ser., XII, 1924, pp. 99-100; Salamanders of the Plethodontidae, Smith College 50th Aniv. Publ., 1926, pp. 354, 368-371 (part. not MCZ Nos. 8404, 8408).

This small species appears to be widely distributed at high elevations in Central Mexico; in these localities it is the most common species.

The following specimens of *O. chiropterus* are in the collection: EHT-HMS Nos. 4129-4156, 4158-95; 4197-4232, 4381-4383, 4385-4388, 4390-4404, 4406-4430, 4432-4446, 4448-4454, July 30, 31, 1932, and 4460-4499, July 11, 1932, from near Rio Frio, Puebla, elevation 9,000 to 10,000 feet; Taylor and Smith.

Nos. 12144-12165, 12167-12177, 12179-12185, Aug. 12 at km. 58, near Rio Frio, Puebla, elevation about 10,000 feet; Taylor.

Nos. 4233-4312, 4500-4503, July 18, 1932, Taylor and Smith, and Nos. 12000-12006, 12008-12029, 12031-12039, 12041-12047, 12053,

12060, 12061, 12071, 12076, 12082, 12087, Sept. 2, Taylor, Cruz Blanca and slopes of Cofre de Perote up to 11,000 feet, Veraacruz.

Nos. 3971-3972, Sept. 15, 1935, Taylor; No. 4380, July 11, 1932, Taylor and Smith, and Nos. 4512-4514, 4516-4517, 4521-4532, Taylor, km. 50 near Tres Cumbres, Morelos; Nos. 12271-12291, 12293-12329, 12331-12333, 12335-12411, 12417-12419 km. 35 near Tres Cumbres, in a pedregal, July 6, 1936, Taylor and Smith.

Nos. 12124-12140, 12233, 12234, 12237, 12240, 12243, 12246, 12253, 12254, 12261, 12262, 12264, 12420-12428, 12430-12432, 12434-12437, 12440-12488, 12490-12492, Lake Zempoala, Morelos, elevation 10,000 to 11,000 feet, Aug. 5, 6, 1936, Taylor.

Diagnosis. A small species with the feet and hands partially webbed; first finger and first toe short, completely involved in the web; 13 costal grooves; vomerine teeth in two very short series of six or seven teeth tending to meet at an oblique angle, the series separated by a distance equal to the normal space between two teeth; extending to inner level of choanae; females with a maxillary-premaxillary series of 20-24 teeth, the series beginning about middle of eye; adult males with about six or seven teeth in the series beginning much in advance of the eye, the teeth much enlarged; the four premaxillary teeth much enlarged, but while visible externally do not, or only occasionally, pierce the lip; no canthus rostralis; large, plainly visible hedonic gland on tip of chin in male, and a small gland behind and slightly above insertion of hind limb; a continuous median dorsal groove not reached by the lateral grooves. Tail longer than snout-to-vent length. Color variable; dull grey or bluish black on entire dorsal and lateral surfaces, with ventral surfaces lighter; or dorsal surface creamy-vinaceous, with sides blackish. Sometimes the lighter cream color forms two dorsolateral lines, the vinaceous a median stripe; others are uniformly lighter, nearly lavender above with lighter shades below. One specimen is cream with the pigment segregated to form irregular spots above and below.

Variation. The vinaceous pattern at times is so constant that one feels that one is dealing with a distinct race; yet this same variation crops up with greater or lesser degree of frequency throughout the range. The limbs when adpressed are separated by from four and one half costal folds to two costal folds. The higher number usually applies to females, while in typical males the limbs are separated by two to two and one half folds.

Remarks. The species is known from the states of Veracruz,

Puebla, México, Morelos and Distrito Federal. I failed to obtain specimens of the species on Nevada de Toluca at elevations where one would normally expect them to be plentiful.

Cope's *Spelerpes orculus* from the Mexican Tableland seems to be properly associated with this species as a synonym.

Oedipus pennatulus (Cope)

1869. *Thorius pennatribus* (typ. err.) Amer. Nat., 1869 p. 222.

1869. *Thorius pennatulus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1869, pp. 111-112; (type description; type locality, "Orizava," Mexico, F. Sumichrast, collector; type USNM, No. 6341 originally); Boulenger, Cat. Batr. Grad. British Mus. (2), 1882, p. 79, pl. 3, fig. 2 (head and neck) (Orizaba, Mexico); Cope, Bull. U. S. Nat. Mus., 34, pl. 27, figs. 2-4 (Skull, *vide*, Dunn 1926); Günther, Biologia Centrali-Americana, Rept. Batr., 1902, pp. 304-305; Gadow, Proc. Zool. Soc. London, 1905, p. 202.

1883. *Thorius* (*sic*) *pennatulus* Brocchi, Mission Scientifique au Mexique et dans l'Amérique Centrale, part 3, sec. 2, Etude des Batraciens, Livr. 3, 1883, p. 119.

1922. *Oedipus pennatulus* Dunn, Proc. Biol. Soc. Washington, 35, Mar. 20, 1922, p. 6; and Field Mus. Nat. Hist., Zool. Ser., XII, May, 19, 1924, pp. 99, 100 (key); and The Salamanders of the Family Plethodontidae, Smith College Fiftieth Anniversary Publications, 1926, pp. 469, 374-376, fig. 64, map.

?1877. *Spelerpes* sp. Wiedersheim, Morph. Jahrb. 3, 1877, pp. 427, 482, 498, pl. 21, fig. 48, pl. 24, fig. 87 (Veraeruz; Dunn suggests that this should be in this synonymy. If so it is likely the locality refers to the state, not the city).

?1877. *Spelerpes minimus* Wiedersheim *loc cit.*, p. 544 (Veraeruz).

Description of species. (From EHT, Nos. 12141-12143, 12343A, 12343B; collected near Acultzingo, Veraeruz, Aug. 14, 1936, by E. H. Taylor.) Very small species; body moderately slender, the tail about one and one third times as long as head and body; snout blunt, somewhat oval, seen from above, the eyes extending beyond outline of head; no canthus rostralis, and no longitudinal groove behind eye; first vertical groove close behind angle of mouth; eye large, its length greater than length of snout; both eyelids fitting under the fold of skin behind eye; nostril very large, its diameter more than one third of eye; edge of lip slightly swollen at the groove; angle of the jaw a little behind the angle of the eye; width of head contained in head-body length, 7.3 times; head length in head-body length, 5.6 times; 13 costal grooves from axilla to groin; the foreleg covers three costal folds, the hind leg four; when limbs are adpressed, separated by 6 folds; limbs weak, fingers 3, 2, 4, 1 in descending order of length; one and four are not free at tip; toes 3, 4, 2, 5, 1 in descending order of length, the two outer toes rudimentary, not free at their tips; anal lips slightly rough; vomerine teeth in short series *not* extending beyond nares; three to five teeth in series; no teeth on maxilla; parasphenoid teeth in a single, rather broad patch; three teeth on the premaxilla.

Color. Above brown, color only slightly lighter than the dark lateral bands which merge imperceptibly into the ventral color-

tion (under magnification the ventral coloration consists of closely-set circular, cream dots separated by black reticulation); a few lighter flecks on ventral surface of belly and chin.

Variation. The dorsal lighter band is evident on all the specimens and the light flecking is present on ventral surfaces and sides; the head is the color of the sides; one specimen has a suggestion of a dim row of darker flecks on the dorsal median line.

Measurements and data on *Oedipus pennatulus* Cope

Number.....	12141	12142	12143	2245	2244
Snout to vent.....	25.2	18.4	21.2	20.2	21.2
Snout to gular fold, below.....	4.5	3.6	4	3.8	4
Snout to foreleg.....	7.1	5.2	6.1	6.1	6.5
Tail.....	33.2	19*	28	25	22.5*
Width of head.....	3.45	2.8	3.5	3.8	3.5
Arm.....	3.4	3.2	3.5	3.8	3.5
Leg.....	4	3.3	4	4.1	4.1
Axilla to groin.....	15.4	10.8	12	12.3	13.5
Costal grooves.....	13	13	13	13	13
Grooves on tail.....	40	28*	39	32+	22+

* Not complete.

Remarks. These small specimens were taken under rocks at the top of a mountain south of Acultzingo (where the highway crosses). When found they were closely coiled in a watch-spring spiral, and remained so coiled until about five seconds after being placed in alcohol.

Oedipus lineolus (Cope)

(Pl. XXIX, fig. 3)

1865. *Spelerpes lineolus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1865, p. 197 (type locality, Mexican tableland; C. Sartorius, collector); idem, 1866, p. 132 (Orizaba, Veracruz); idem, 1868, p. 313 (Córdoba, Veracruz); Boulenger, Cat. Batr. Grad. British Mus., (2) 1882, p. 74 (Orizaba, "Mexico"); Brocchi, Mission Scientifique au Mexique et dans l'Amérique Centrale, Etude des Batraciens, part 3, sec. 2, livr. 3, 1883, p. 111; "Orizaba" Veracruz, Günther, Biologia Centrali-Americana, Batrachia, Jan., 1902, p. 304 (Orizaba).

1869. *Ophoeotrachus lineolus* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1869, pp. 101-102 (Eastern Mexico).

1884. *Grottriton lineolus* Garman, Bull. Essex Inst. 16, 1884, p. 39.

1887. *Oedipina lineolus* Cope, Bull. U. S. Nat. Mus., 32, 1887, p. 8.

1896. *Oedipina lineola* Cope, Amer. Nat., 1896, p. 1022 (distribution).

1924. *Oedipus lineolus* Dunn, Field Mus., Nat. Hist. Zool. Ser., XII, No. 7, Publ. 221, May 19, 1924, pp. 99, 100; and The Salamanders of the Family Plethodontidae, Smith College Ann. Ser., 1926, pp. 422-425, map, fig. 81 (Mexican tableland; Jalapa, Veracruz).

?1879. *Spelerpes (Oedipus) infusatus* Peters, Monatsb. Konigl. preuss. Akad. Wiss. Berlin, 1879, p. 778 ("Hayti." Seems probable that this locality is erroneous).

?1902. *Spelerpes uniformis* (part.) Günther, Biologia Centrali-Americana, 1902, p. 304.

Description of the species. From EHT-HMS, No. 2415; collected about 10 km. southeast of Cordova, near San Lorenzo, Veracruz, Aug. 20, 1937.

Body slender, cylindrical, wormlike; the tail elongated, nearly as thick as body, tapering rather suddenly near the tip; snout blunt, truncate, the eyes protruding beyond outline of head when seen from above; no canthus rostralis; no longitudinal groove behind eye; vertical groove a little behind angle of mouth; visible below, and arising to upper level of eye; angle of jaw is much behind posterior angle of eye; both eyelids fit under a fold of skin posteriorly; second groove, forming a nuchal fold below, and practically encircling neck; eye distinctly longer than the snout; nostrils small; no swollen area about the narial groove; 14 costal grooves, counting the dim ones in axilla and groin; about 43 grooves on tail. Limbs very slender, short, the anterior reaching to about the third costal groove, the hind leg reaching to very near 12th groove, leaving the adpressed limbs separated by 9 complete costal folds; fingers very minute, their descending order of size, 3, 2, 4, 1, the tip of the first involved in skin, others free; order of length in toes, 3, 2, 4, 5, 1, the tip of first toe not free; anal lips apparently smooth.

Vomerine teeth, in two curved series, consisting of 10 and 13 teeth, meeting medially; parasphenoid teeth in two groups, confluent anteriorly, divergent posteriorly, separated from the vomerine teeth by an interval more than half distance between the choanae; maxillary and premaxillary with teeth.

Color. Above dark, nearly black; below grayish-black (under magnification the ventral coloration consists of minute round cream dots of various sizes, separated by black). A few scattered cream flecks on the chin, throat and side of head, especially below eye.

Measurements (in mm.). Snout to vent, 34.5; snout to arm, 9.4; width of head, 3; axilla to groin, 21.2; tail, 51.5; total length, 86; head width, in snout-to-vent length, 11 times. (I suspect that the tail has been reproduced.)

Remarks. I found this specimen on the side of a rocky hill southeast of Cordova. The specimen was hidden in a pile of wet chips about the base of a stump.

The species has remained very rare in collections. Dunn (1926) was able to examine but three specimens. From the measurements recorded, either the species is variable or the differences in proportion are due to age and sex. Dunn (1926) has referred the Haitian, "*infuscatus*" of Peters, to this form.

Oedipus salvinii Gray

(Plate XXVIII, fig. 2)

1868. *Oedipus salvinii* Gray, Ann. Mag. Nat. Hist. (4), 2, p. 297 (type description: type locality, Guatemala, Pacific Coast; O. Salvin, collector); Sumichrast, Bull. Soc. Zool. France, 5, 1880, p. 190; and La Naturaleza, 6, 1882, p. 79; Dunn, Field Mus. Nat. Hist. Zool. Ser., XII, May, 1924, pp. 99, 100 (key); The Salamanders of the Family Plethodontidae, Smith College Fiftieth Anniversary Publications, 1926, pp. 405-408, fig. 74, map. Schmidt, Field Mus. Nat. Hist., Zool. Ser., XX, No. 17, Oct. 31, 1936, pp. 147-148, fig. 17.

1879. *Oedipus carbonarius salvinii* Cope, Proc. Amer. Philos. Soc., 18, 1879, p. 267.

1882. *Speleperes variegatus* Boulenger, Cat. Batr. Grad. s. Caud. British Mus., 2d ed., 1882, p. 73 (part.).

1887. *Oedipus variegatus salvinii* Cope, Bull. U. S. Nat. Mus., No. 32, 1887, p. 8.

1878. *Speleperes salvinii* Müller, Verh. Naturf. Ges. Basel, 6, 1878, p. 579 ("Guatemala"); Strauch, Salamanders, p. 84 (not seen); Brocchi, Mission Scientifique au Mexique et dans L'Amérique Centrale, Etude sur Batr., livr. 3, 1883, p. 117, pl. 18, figs. 3, 3a, 3b, 4, 4a, 4b, (Tehuantepec); De Leon, Índice de los Batracios que se encuentran en la República Mexicana, Tacabuya, June, 1904, p. 38.

1896. *Speleperes variegatus* Werner, Verh. Ges. Wien, 46, p. 351; Günther, Biologia Centrali-Americana, Rept. and Batr., Jan., 1902, p. 302 (part.), pl. 75, fig. D.

1878. *Speleperes* sp. affm. sp. *salvinii* Müller, Verh. Naturf. Ges. Basel, 6, 1878, pp. 579, 645, pl. III, figs. C. C., D (Guatemala).

Description of species. (From EHT-HMS, No. 3995, ♀; collected at Tonolá, Aug. 27-31, 1935.) (Taken in a freight car on railway.) Body, typical salamander form. Head flattened, the outline a truncate oval, distinctly wider than body; eye relatively small, its length not as long as snout, but about equal to its distance from the nostril; the hind part of eyelids inserted under a fold of skin; nostrils small; a swelling below nostril about groove on upper lip; the angle of the jaw extends far behind the posterior corner of eye. An ill-defined shallow groove from eye to first vertical groove. A strongly-defined gular fold which reaches up only a short distance on the sides of neck; vomerine teeth in two curved series, practically meeting medially, and extending laterally beyond the choanae; about 15-17 teeth in a series; parasphenoid teeth in a large patch pointed anteriorly, posteriorly with a median notch, separated from the vomerine teeth by twice width of a choana; maxillary tooth series large, extending back to the middle of the eye socket; thirteen costal grooves; the adpressed limbs separated by three and one half folds; limbs strong, the arm reaching eye; fingers fully webbed, flattened; the front outline of hand scalloped; toes completely webbed, flattened. Tail slightly longer than head and body, distinctly constricted at base; anal lips smooth or slightly folded.

Color. Above deep purplish lavender broken into irregular areas and surrounded by cream borders; beginning on snout an irregular, yellow, more or less discontinuous line extends dorsolaterally; beginning behind the eye is a broad chocolate band, very irregular on its upper edge, and fairly straight on lower edge (somewhat laven-

der on the upper edge). Lips and ventral surface of head and body cream-yellow with a few flecks of darker color; under tail same, but flecked more heavily with lavender; tail dark purplish lavender, reticulated on at least proximal half with cream.

Measurements (in mm.). Snout to vent, 81; snout to jaw angle, 10.2; snout to gular fold (ventral), 19; snout to insertion of arm, 24; width of head, 12; tail, 86; arm, 18; leg, 19; axilla to groin, 50; width of head in snout-to-vent measurement, 6.75 times; head length into snout-to-vent measurement, 4.26.

Remarks. Since this specimen was taken in a freight car used for transporting bananas, its provenance is uncertain; however, it seems very probable that it originated on the coast, most probably in southern or central Chiapas.

Oedipus platydictylus (Cuvier)

(Plate XXVIII, fig. 1)

1831. *Salamandra variegata* Gray, in Griffiths Cuvier's Animal Kingdom, 9, p. 107 (not of Bory St. Vincent, 1829, Dict. Class. Hist. Nat., 15, p. 68) (type description; type locality, Mexico).

1831. *Salamandra platydictylus* Cuvier, in Gray, Griffith's Cuvier's Animal Kingdom, p. 107.

1838. *Oedipus platydictylus* Tschudi, Mem. Soc. Sci. Nat. Neuchâtel, 1838, p. 58; Dunn, Field. Mus. Nat. Hist. Zool. Ser., XII, May, 1924, pp. 99, 100; and The Salamanders of the Family Plethodontidae, Smith College, Fiftieth Anniversary Publications, 1926, pp. 400-403, fig. 73, map.

1850. *Oedipus variegatus* Gray, Cat. Batr. Grad. British Mus., 1850, p. 48; Ann. Mag. Nat. Hist., 2, 1858, p. 300; Moore, Proc. Acad. Nat. Sci. Philadelphia, 1900, p. 619; Fowler and Dunn, Proc. Acad. Nat. Sci. Philadelphia, 1917, p. 19.

1854. *Bolitoglossa Mexicana* Duméril and Bibron (*part.*), Exp. Gén., V, 9, 1854, p. 93, pl., 104, fig. 1 (Dolores, Petén, Guatemala).

1860. *Geotriton carbonarius* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1860, p. 373; (type description; type locality, Jalapa, Mexico); Journ. Acad. Nat. Sci. Philadelphia (2), 6, 1866, p. 98.

1869. *Oedipus carbonarius* Cope, Proc. Acad. Nat. Sci. Philadelphia, 1869, p. 103; and Proc. Amer. Philos. Soc., 1879, 18, p. 267; Sumichrast, Bull. Soc. Zool. France, 1881, p. 231; and La Natureza, 6, 1882, p. 78.

1870. *Geotriton variegata* Garman, Bull. Essex Inst., 16, 1884, p. 39.

1883. *Spelerpes Mexicanum* Brocchi, Mission Scientifique au Mexique, Etude sur les Batraciens, livr. 3, 1883, p. 113, pl. 18b, figs. 1, 2, 3, 4.

1883. *Spelerpes Copei* Brocchi, *loc. cit.*, p. 113.

1883. *Spelerpes punctatum* Brocchi, *loc. cit.*, p. 115, pl. 20, figs. 345 (type description; type locality, Alta Vera Paz, Guatemala).

1870. *Spelerpes variegatus* Strauch, Mem. Acad. Sci. St. Petersburg (7), 16, 4, p. 84; Müller, Verh. Naturf. Ges. Basel, 1878, 6, p. 579; Boulenger, Cat. Batr. Grad. s. caud., 2d ed. 1882, p. 73; Lönnberg, Zool. Anz., 1899, p. 545; Günther, Biologia Centrali-Americana, Batr. Rept., Jan., 1902, pp. 302-303, pl. 75, figs. A. B. C.; Werner, Abh. Bayer Akad., 22, 1903, p. 352; Gadow, Proc. Zool. Soc. London., 1905, p. 203; and Zool. Jahrb., 1910, p. 305; Ruthven, Zool. Jahrb., 23, 1912, p. 305; and Rept. Michigan Acad. Sci., 14, 1912, p. 231.

1884. *Geotriton variegata* Garman, Bull. Essex Inst., 16, 1884, p. 39.

1884. *Geotriton Mexicana* Garman, Bull. Essex Inst. 16, 1884, p. 40.

1894. *Spelerpes Mexicana* Dugès, La Natureza (2), 2, 1894, p. 377.

The collection contains specimens of this species from the following localities: EHT-HMS, Nos. 3964, 15 mi. S. Valles, San Luis Potosí, June 13, 1932, E. H. Taylor and Hobart M. Smith, collectors; 15200, near San Lorenzo, Cordova, Veraacruz, Aug. 19, 1936, E. H. Taylor, collector; 15201, Potrero Viejo, Veraacruz, Aug. 23, 1937, E. H. Taylor, collector; 15202, 5 miles each of Córdoba, Veraacruz, H. R. Roberts, collector.

Description of species. (From EHT-HMS, No. 15202.) A large *Oedipus*, the body moderately robust. Head seen from above, truncate oval, the eyes moderately prominent, extending slightly beyond outline of head; nostrils small, with a prominent swelling below them near the lip about the groove; length of eye slightly greater than its distance to nostril, but longer than the snout; a groove from behind eye joins the first nuchal groove, which is continuous across the throat, though but dimly visible (strongly visible in No. 15200); second nuchal groove crosses neck and arises high on the side of neck; angle of jaw far back of posterior corner of the eye; posterior parts of eyelids fit under a fold of skin; body with thirteen costal grooves from axilla to groin; the limbs, where adpressed, separated by about four folds; limbs strong, both fingers and toes well developed, flattened, enclosed in webs; the anterior edges of the palmar hands and feet scalloped; anal slit without papillae; but the inner walls strongly folded; tail tapering gradually, slightly compressed.

Vomerine teeth in two curved series of 13 teeth each, almost in contact medially, extending to outer (lateral) edge of the choanae; a single large patch of parasphenoid teeth, separated from the vomerine teeth by the width of a choana.

Color. Above the color is light buff to fawn, and covers the whole dorsal surface, save head, which is more or less covered by a dark triangular patch, the apex of which extends back on the neck; a few lighter flecks on the head; sides of head, body and tail and all ventral surfaces dark plumbeous to blackish, practically uniform.

MEASUREMENTS OF *OEDIPUS PLATYDACTYLUS* (CUVIER)

	No. 15202	No. 15200
Snout to vent	72	43
Snout to jaw angle	9	6.8
Snout to gular fold.....	16.2	10.3
Snout to forelimb	21	13
Width of head	10	7
Axilla to groin.....	43.5	26.6
Arm	13	9
Leg	15	10
Tail	73	42

Variation. Nos. 15200 and 3964 have some black flecks or streaks on the back and tail. I recently examined a large specimen from Tamazunchale, San Luis Potosí, belonging to Mr. Ottys Sanders, Dallas, Texas, in which the lateral and ventral coloration was coal-black.

Remarks. Certain of the more striking color variants have been described as distinct species (*variegatus*, *carbonarius*); it seems likely that Duméril is correct in placing these in synonymy. However, the buff-colored form here discussed is apparently the typical *platydactylus*.

The specimens from San Luis Potosí carry the range much farther north than known heretofore.

Gymnopsis multiplicata oaxacae Mertens

1930. *Gymnopsis multiplicata oaxacae* Mertens, Abh. Ber. Mus. Natur.—Heimatk. Natur. Ver. Magdeburg, Bd. VI, heft II, 1930, pp. 153-155, fig. 14 (from Blätter Aquar. Terr.-Künde 1928); (type description; type locality, Cafetal Concordia, 600 m. between Puerto Angel and Salina Cruz, Oaxaca, México; Lafrentz, collector).

A single specimen, EHT-HMS, No. 4604, of this rare form was collected by H. M. Smith on the hills east of Tonolá, Chiapas. It presents the following characteristics:

A total of 131 primary folds anterior to anus; the 13 anterior folds and the posterior 18 completely encircle the body—the total of primary and secondary folds on body and tail, 236; a strongly developed nuchal fold with lateral grooves meeting medially; first nuchal groove crosses throat, passes back of the angle of jaw and across the head; the area between the two aforementioned grooves partially divided by a short transverse groove on the dorsal part of the neck, and by a somewhat longer transverse groove on the throat; nostrils small, the distance between them (2.5 mm.) less than the distance between the nostril and the globular tentacle (3.2 mm.); eye to nostril (4.6 mm.) a little less than interorbital distance (5 mm.), which equals the length of snout; snout projecting 1.7 millimeters beyond mouth; 15-16 maxillary teeth on each side, inner, vomero-palatine series 16-18; a single series of teeth in lower jaw, 11-12 on each side, large, conical, much larger than teeth on upper jaw; two small papillae in the preanal region; four or five in the postanal region; a prominent lateral "fold" or "ridge" extends the length of the body.

Measurements (in mm.). Length of head to angle of the jaws, 11.1; width of head, 7.3; snout to gular fold, 12.5; total length, 34.0; tail, 2; body width, 10; body width in length, 34 times.

Remarks. It may be noted that this form departs from the typical generic characteristics in lacking the inner row of teeth in lower jaw; the teeth in general, instead of being small and subequal, are relatively large and vary greatly in size in the lower and upper jaws.

The specimen was found under a log burrowed in hard earth near to the top of the large hill about three miles east of Tonolá.

I acknowledge indebtedness to Dr. E. R. Dunn for the identification of this species under the name here used.

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PLATE XXIV

FIG. 1. *Ambystoma* sp. Shaw. EHT-HMS. No. 3997. Rancho Guadalupe, near San Martin, Mexico; actual snout-to-vent measurement, 80 mm.; total length, 150 mm. Not discussed in text.

FIG. 2. *Rhyacosiredon altamirani* (Dugès). EHT-HMS. No. 12511. Near Lake Zempoala, Morelos, 11,000 ft. elevation. Actual snout-to-vent length, 68.2 mm.; total length, 143.2 mm.

PLATE XXIV



PLATE XXV

FIG. 1. *Ocdipus orizabensis* (Blatchley). EHT-HMS. No. 12067. Lake Zempoala, Morelos; actual snout-to-vent length, 53.5 mm.; total length, 99.5.

FIG. 2. *Ocdipus orizabensis* (Blatchley). EHT-HMS. No. 12239 (same locality as 12067); actual snout-to-vent length, 56 mm.; total length, 105 mm.

FIG. 3. *Ocdipus altamontanus* sp. nov. EHT-HMS. No. 12245. Type. Near Lake Zempoala, Morelos; 10,500 feet; actual snout-to-vent length, 48.6 mm.

FIG. 4. *Ocdipus altamontanus* sp. nov. EHT-HMS. No. 12239. Paratype. Same locality; actual snout-to-vent length, 40 mm.

FIG. 5. *Ocdipus smithi* sp. nov. EHT-HMS. No. 3965 ♂. Paratype. Cerro de San Luis, Oaxaca, Oaxaca; actual snout-to-vent length, 69 mm.; total length, 139 mm.

FIG. 6. *Ocdipus smithi* sp. nov. EHT-HMS. No. 3966 ♀. Type, Cerro de San Luis, Oaxaca, Oaxaca; actual snout-to-vent length, 69 mm.; total length, 145 mm.

PLATE XXV

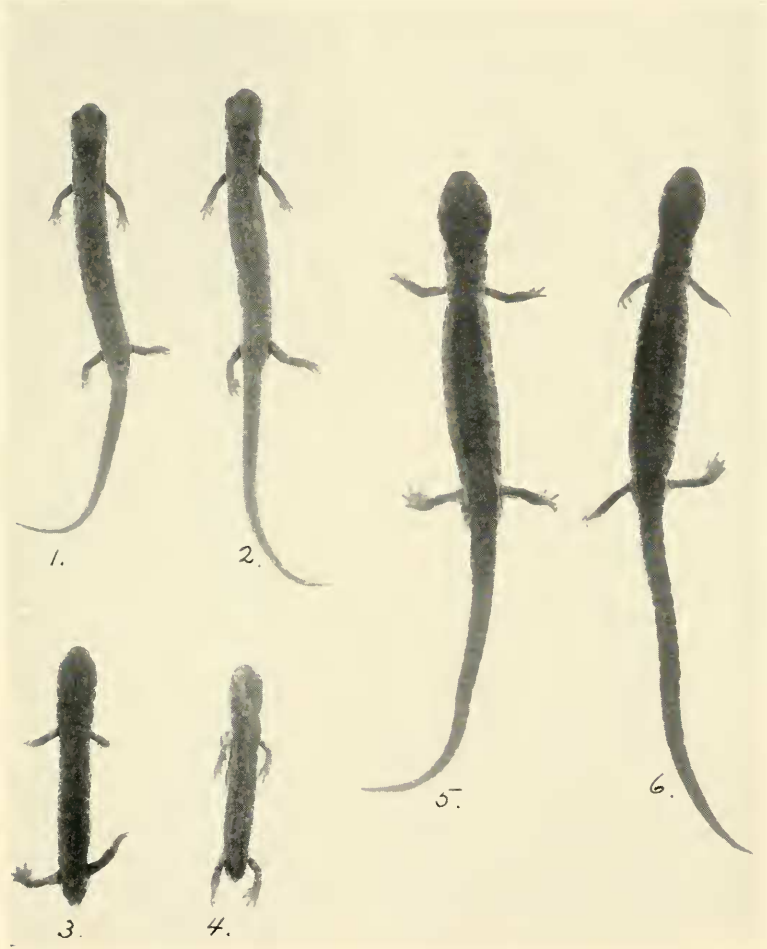


PLATE XXVI

FIG. 1. *Ambystoma schmidti* sp. nov. EHT-HMS. No. 3999. Type. Rancho Guadalupe, 10 mi. E. San Martin (Asuncion), México; actual snout-to-vent length, 52 mm.; total length, 89 mm.

FIG. 2. *Oedipus robertsi* sp. nov. EHT-HMS. No. 12503. Nevada de Toluca, México, between 10,000 and 11,000 feet; actual snout-to-vent length, 51 mm.; total length, 95.8.

FIG. 3. *Oedipus cephalicus* (Cope). EHT-HMS. No. 4539 ♂; east of Rio Frio, Puebla, Mexico. Actual length snout to posterior part of vent, 49.5 mm.; total length, 98 mm.

FIG. 4. *Oedipus cephalicus* (Cope). EHT-HMS. No. 4536 ♀; east of Rio Frio, Puebla, Mexico. Actual snout-to-vent length, 56.5 mm.; total length, 110 mm.

PLATE XXVI



1.



2.



3.



4.

PLATE XXVII

FIG. 1. *Oedipus bellii* (Gray). MCZ. No. 3935, Guerrero, Hidalgo, Mexico. Actual head-body length, 103 mm.

FIG. 2. *Oedipus bellii* (Gray). MCZ. No. 3938, Guerrero, Hidalgo, Mexico. Head-body length, 53 mm.

FIG. 3. *Oedipus giganteus* sp. nov. MCZ. No. 8434, Jalapa, Veracruz, Mexico. Head-body length, 46 mm.

FIG. 4. *Oedipus giganteus* sp. nov. Type. MCZ. No. 8435, Jalapa, Veracruz. Head-body length, 110 mm.

PLATE XXVII

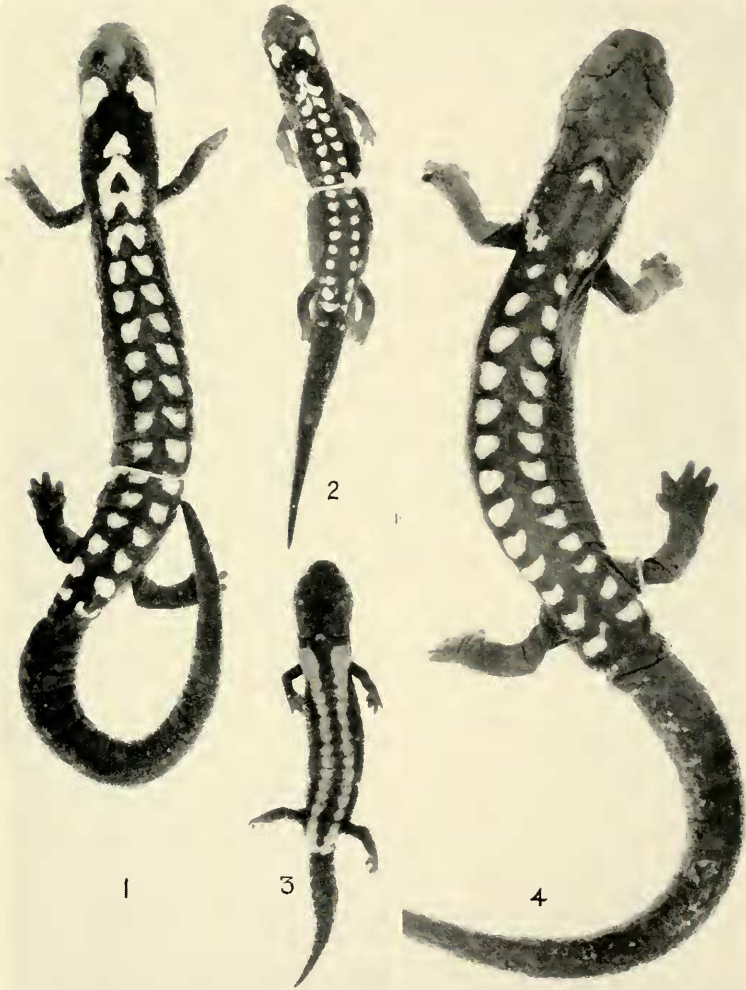


PLATE XXVIII

FIG. 1. *Oedipus platydactylus* (Cuvier). EHT-HMS. No. 15202, 5 miles east of Córdoba, Veracruz, Mexico. Head-body length, 72 mm.

FIG. 2. *Oedipus salvinii* Gray. EHT-HMS. No. 3995 ♀, (?) Tonolá Chiapas, Mexico. Head-body length, 81 mm.

PLATE XXVIII

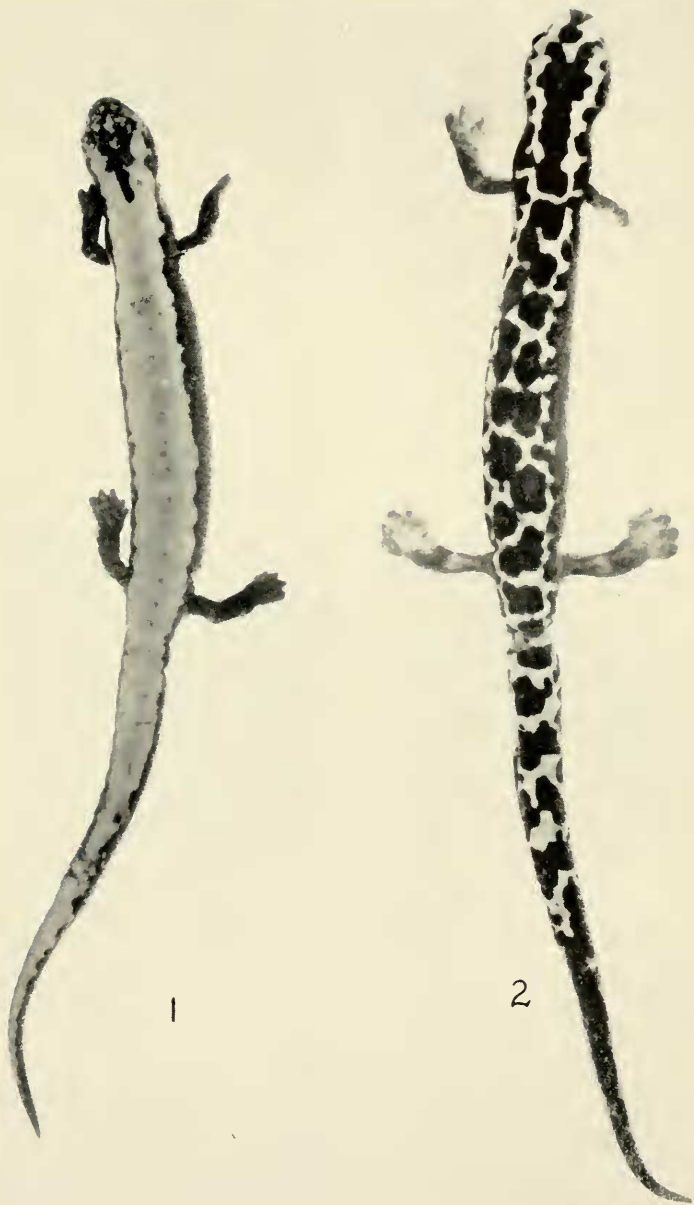


PLATE XXIX

FIG. 1. *Oedipus multidentata* sp. nov. Type. MCZ. No. 14812. Alvarez, San Luis Potosí, Mexico. Head-body length, 39.5 mm.

FIG. 2. *Oedipus leprosus* (Cope). MCZ. No. 7659. Zometla, Orizaba, Mexico. Head-body length, 57 mm.

FIG. 3. *Oedipus lincolus* (Cope). EHT-HMS. No. 2415. Near Córdoba, Veracruz, Mexico. Total length, 86 mm.

FIG. 4. *Oedipus manni* sp. nov. MCZ. No. 3916. Guerrero, Hidalgo, Mexico. Head-body length, 48 mm.

FIG. 5. *Oedipus manni* sp. nov. MCZ. No. 3915. Type. Guerrero, Hidalgo, Mexico. Head-body length, 53.2 mm.

FIG. 6. *Oedipus manni* sp. nov. MCZ. No. 3925, Guerrero, Hidalgo, Mexico. Head-body length, 46 mm. Ventral view.

PLATE XXIX

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